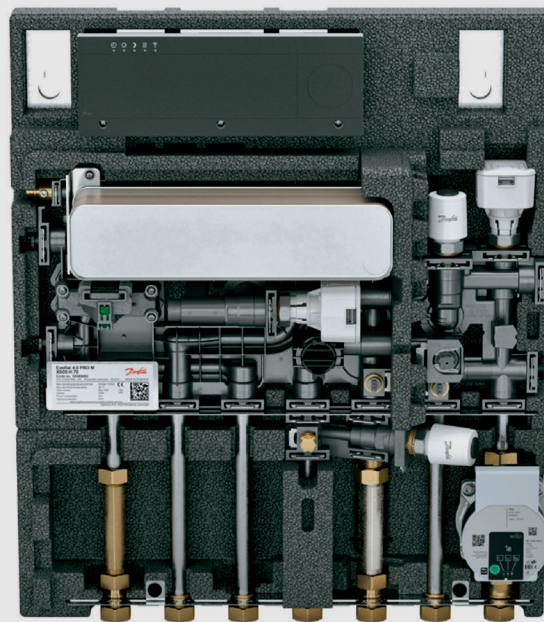




Flat Stations

EvoFlat 4.0 M PRO

Full electronic flat station for direct floor heating and instantaneous domestic hot water

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1. Safety notes

1.1 Safety notes - general

The following instructions refer to the standard desiging of flat stations.

It is not allowed to work with any kind of tool on the composite block, however only when working with high temperature connection set (HTC) and domestic hot water circulation set (DHW-C), for mounting these.

This installation guide should be read carefully before installation and start-up of the flat station. The manufacturer accepts no liability for damage or faults that result from non-compliance with the operating manual. Please read and follow all the instructions carefully to prevent accidents, injury and damage to property.

Please comply with the instructions issued by the system manufacturer or system operator.



Authorized personel only

Assembly, start-up and maintenance work must be performed by qualified and authorized personel only.



Please observe instructions carefully

To avoid injury to persons and damage to the device, it is absolutely necessary to read and observe these instructions carefully.

Corrosion protection

All connectionspipes are made of stainless steel with brass nuts. The maximum chloride compounds of the flow medium should not be higher than 150 mg/l. The risk of equipment corrosion increases considerably if the recommended level of permissible chloride compounds is exceeded.

Energy source

The flat station is designed to be connected to decentralized heating installations with various energy sources, such as district heating, central boiler (gas, oil, biomass, etc.), solar, heat pump or combination between them if the operating conditions allow it.

Application

The flat station is designed to be connected to the house installation in a frost-free room, where the temperature does not exceed 50 °C and the humidity does not exceed 80%. Do not cover or wall up the flat station or in any other way block the entrance to the station.



Warning of high pressure and temperature

Be aware of the installtion's permissible system pressure and temperature. The maximum temperature of the flow medium in the flat station is 95 °C.

The maximum operating pressure of the flat station is 10 bar.

The risk of persons being injured and equipment damaged increases considerably if the recommended permissible operating parameters are exceeded.



Warning of hot surface

The flat station has got hot surfaces, which can cause skin burns. Please be extremely cautious in close proximity to the flat station.

Power failure can result in the motor valves being stuck in open position. The surfaces of the flat station can get hot, which can cause skin burns. The ball valves on heating source supplyr and return should be closed.

Choice of material

Choice of material always in compliance with local legislation.

Connection

The flat station must be equipped with features that ensure that the flat station can be separated form all energy sources (also power supply).

Emergency

In case of danger or accidents, fire, leaks or other dangerous circumstances, interrupt all energy sources to the station if possible, and seek expert help.

In case of discoloured or bad-smelling domestic hot water, close all shut-off valves on the flat station, inform the operating personnel and call for expert help immediately.



Warning of transport damage

Before installing the flat station, please make sure that the flat station has not been damaged during transport.

For visible transport damage, respond immediately upon receipt.

For non-visible transport damage, respond within seven days.

Storage

Any storage of the flat station which may be necessary prior to installation should be in conditions which are dry and heated.

Reach

All products of the EvoFlat series comply with the provisions of the REACH regulation. We are therefore obliged to inform our customers about the presence of substances according to the SVHC candidate list, if they are present. We hereby inform you; This product contains brass parts containing lead (CAS 7439-92-1) in a concentration above 1% (W/W).

Potential equalization / grounding

Equipotential bonding is understood as all measures for eliminating electrical potential differences (contact voltages), which can occur between eg. two pipelines. Equipotential bonding is an important measure for protection against electric shock. Equipotential bonding reduces corrosion in the heat exchanger, instantaneous water heaters, district heating stations and plumbing installations. Equipotential bonding should be in accordance with the provisions 60364-4-41:2007 and IEC 60364-5-54:2011.

Binding point is marked with a grounding symbol on the bottom right corner of the mounting plate and there is a hole in the mounting plate and a label with grounding symbol.

Means for disconnection having a contact separation in all poles that provide full disconnection under overvoltage category III conditions must be incorporated in the fixing wiring in accordance with the wiring rules.



IMPORTANT - Tightening of connections

Due to vibrations during transport, all Click-fit connections, electrical clamps and screw connections must be checked and tightened before water is added to the system. After water has been added to the system and the system has been put into operation, re-tighten ALL connections.

Check all Click-fit connections are completely pushed in.

Planning and Installation

The planning and installation of heating and drinking water systems must be carried out in accordance with applicable EN standards and norms, as well as local provisions and regulations.

Any deviation from these requirements will result in the exclusion of the warranty.



Please notice

Interventions and reworking of our components lead to the loss of warranty.

Maintenance

The flat station requires only minimal maintenance. It is recommended to carry out an annual inspection of the station to ensure optimal performance and energy efficiency, as described in chapter 9.

Simplified EU Declaration of Conformity

Hereby, Danfoss A/S declares that the radio equipment type EvoFlat 4.0 Pro is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

<https://assets.danfoss.com/approvals/latest/516805/ID530539552032-0101.pdf>

- frequency band in which the radio equipment operates: BLE 2402-2480 MHz

- maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates: <0dBm

2. Product description

2.1 General

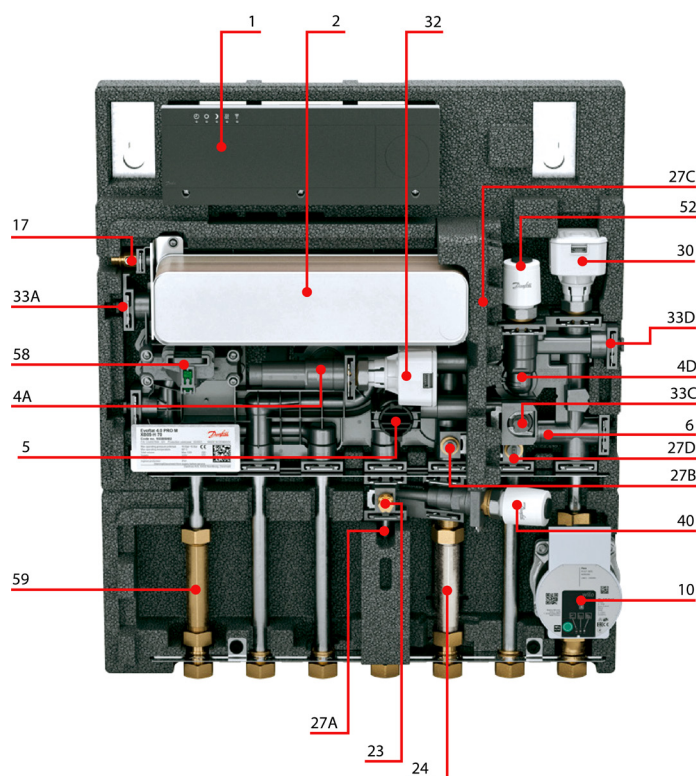
EvoFlat 4.0 M PRO is a fully electronic flat station designed for direct underfloor heating and domestic hot water production, controlled by our new ECL220 controller with numerous intelligent functions.

It can be easily configured using our ECL Go app, which also enables the generation of a commissioning report, providing documentation of the station's configuration. The ECL Go app is furthermore well-suited for troubleshooting and servicing. Online access allows for monitoring and ensuring optimal operation. In addition, consumption can be automatically recorded via M-Bus meters.

2.2 Variants

Subsequently, an EvoFlat 4.0 M PRO station is described. The station you have received may be a variant that does not differ significantly from the standard version.

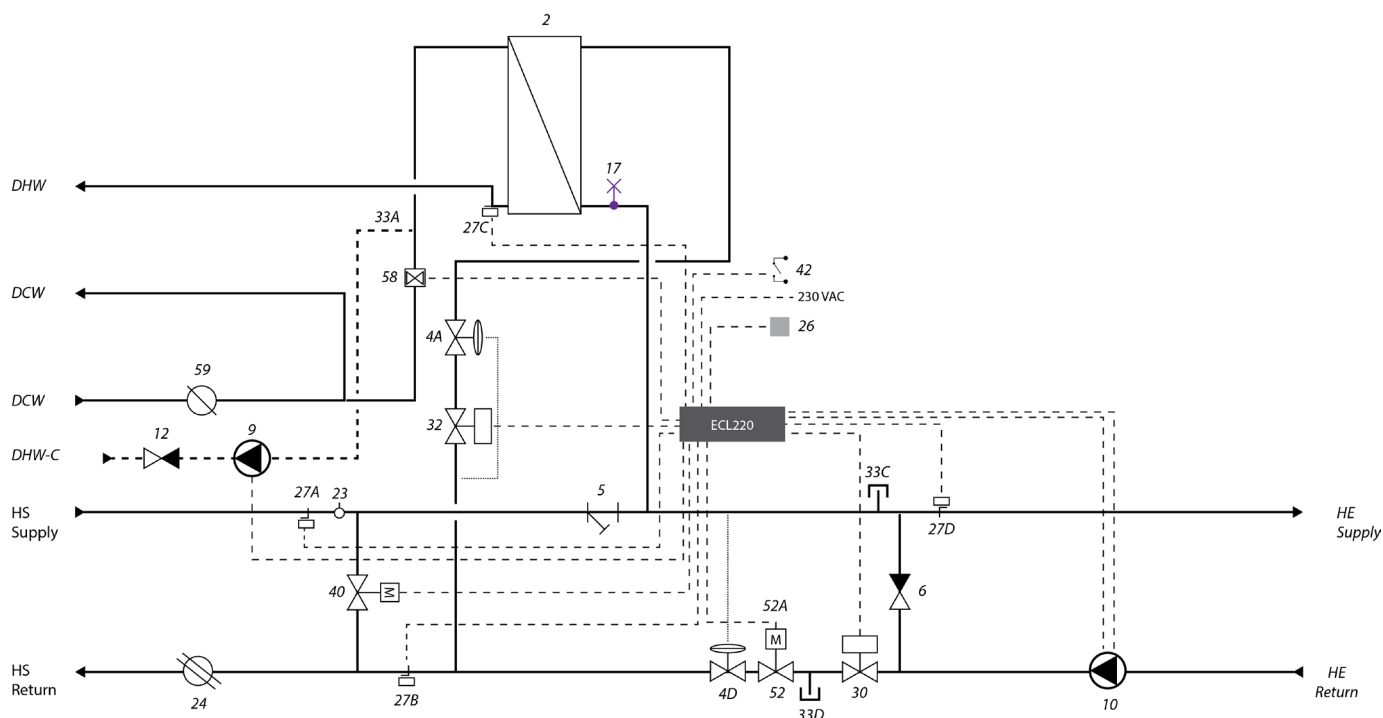
2.3 Main components



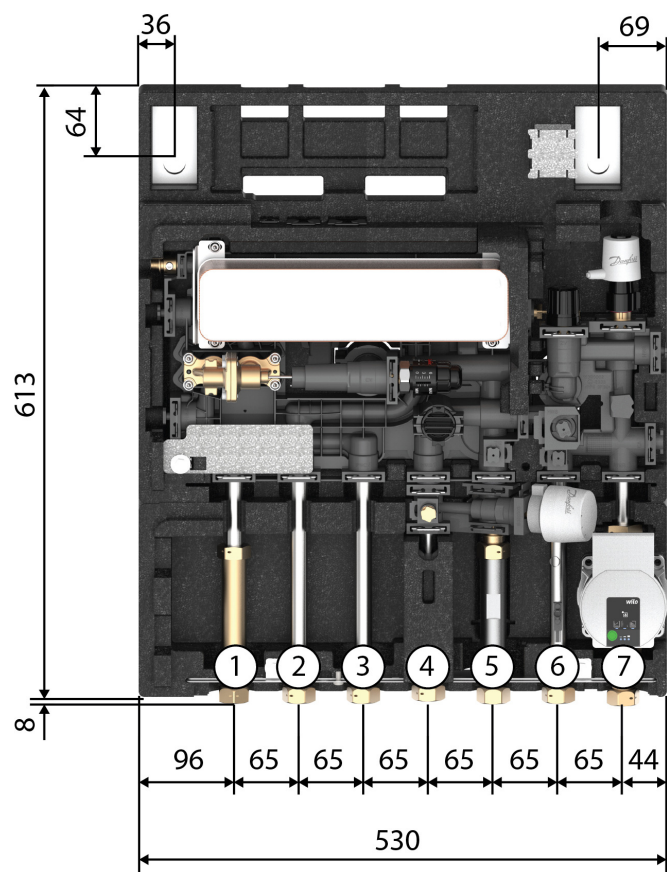
1	ECL 220 controller	27C	Temperature sensor DHW
2	Heat exchanger DHW	27D	Temperature sensor HE supply
4A	Differential pressure controller DHW	30	Heating valve (M2 stepper motor)
4D	Differential pressure controller HE	32	DHW valve (M1 stepper motor)
5	Strainer primary side	33A	Plug for DHW circulation
6	Check valve	33CD	PluG for HTC connection
9	DHW circulationpump*	38	DHW temperature controller
10	HE circulationpump mixing circuit	40	Summer bypass
12	Safety valve*	42	External signal (heating demand)
17	Air vent	52(A)	Zone valve with TWA-NO (Safety valve - normally closed)
23	Sensor pocket for heat meter temperature sensor	58	Flow sensor DHW
24	Fitting piece for heat meter 3/4"x110mm	59	Fitting piece for water meter 3/4" x 110 mm
26	Outdoor/room temperature connection		
27A	Temperature sensor HS supply		
27B	Temperature sensor HS return		

*Optional

2.4 Flow diagram



2.5 Measurements and connections



1. Domestic cold water supply
2. Domestic hot water
3. Domestic cold water return
4. Heat source supply (Primary)
5. Heat source return (Primary)
6. Heating supply (Secondary)
7. Heating return (Secondary)

2.6 Type plate

The picture below shows an example of a nameplate for an EvoFlat 4.0 flat station. It is located on the left side beneath the upper EPP cover.

The nameplate contains, among other details, the following informations:

- Product name
- Code number
- Serial number
- Production week/year
- Production data
- Technical informations
- Country of origin

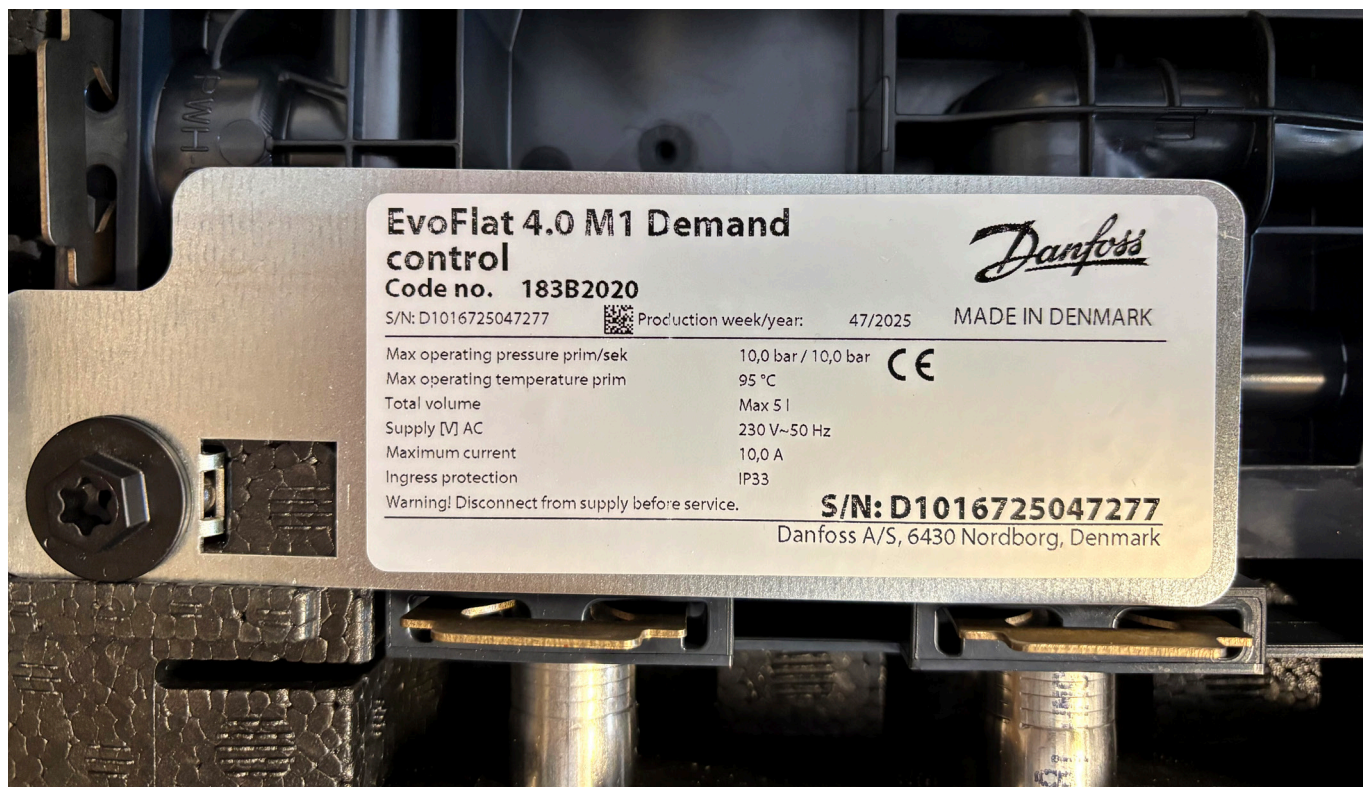
By entering the code number into the search field in the Danfoss Product Store (web), you will be directed to the product page, where all documentation is available.

2.6.1 Service and claims

When contacting the Danfoss Service Department regarding questions about the flat station or warranty claims, the following informations must be provided at a minimum:

- Product name
- Code number
- Serial number
- Production week/year

For claims, a description of the fault and if applicable photographic documentation must also be included.



3. Installation of the flat station

3.1 General

Installation must be in compliance with local standards and regulations.

Heat source (HS), in the following sections, HS refers to the heat source which supplies the flat station with heating. A variety of energy sources, such as district heating, heat pumps, solar power, oil and gas could be used as the primary supply to Danfoss flat stations. For the sake of simplicity, HS can be taken to mean the primary supply.

Metal cabinet

The station can be installed in a dedicated metal cabinet, which must be properly grounded and installed in accordance with local standards and regulation.

Recommended type and conductor dimensions for supply cord: H05VV-F 1.0 mm².



Authorized personel only

Assembly, start-up and maintenance work must be performed by qualified and authorized plumber only.

3.2 Prior to installation

Clean and rinse

Prior to installation, all flat station pipes and connections should be cleaned and rinsed.

Tightening

Due to vibrations during transport, all flat station connections must be checked and tightened before installation. Check that all Click-fit connections are completely pushed in.

Unused connections

Unused connections and shut-off valves must be sealed with a plug. Should a plug require removal, this must only be done by an authorized service technician.



Please notice

Use of sealing or washer types other than that with which the flat station is delivered will void the warranty.

3.3 Wall mounting

The flat station can be mounted to a wall via the two keyholes located at the top of the station. It is important that the screws used to secure the station are properly fastened, taking into account the type of wall.

Adequate space

Please allow adequate space around the flat station for mounting and maintenance purposes. It must be possible to remove the flat station from the wall at any time.

Orientation

The flat station may only be installed with the connections positioned at the bottom.



Please notice

Ensure that the wall on which the station is mounted is sufficiently strong to support it.

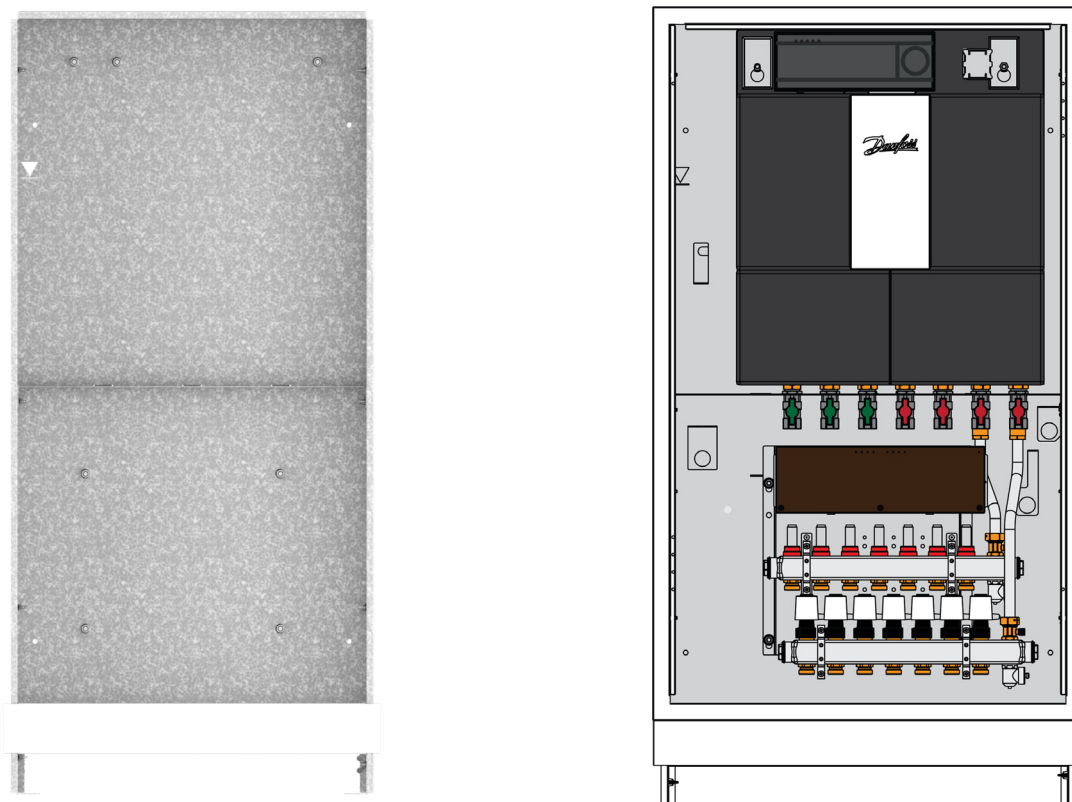
3.4 Mounting in a Danfoss Recess box

Most flat stations are installed in a recess box, which is mounted either in or on a wall. The recess box is fitted with a white metal door, allowing the solution to blend naturally into the home's design.

Time-saving installation

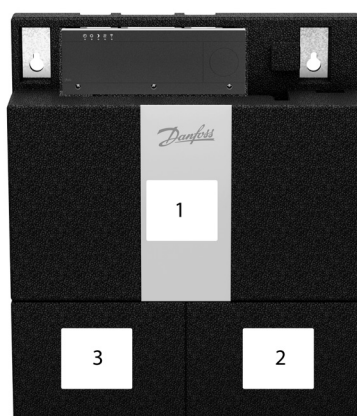
The recess box is prepared with threaded screw holes for the flat station and distribution unit, enabling quick and accurate assembly. On the transverse bar, ball valves, DHW circulation set, and HTC set (if included) are mounted.

The sides and top of the recess box are closed, but feature cut-outs for routing external connections such as 230V power supply, heat source, etc. The bottom of the box is open to facilitate easier connection of underfloor heating pipes.



3.5 EPP cover

To gain access to the flat station components, the EPP cover must be removed in the following order: 1, 2, 3 as shown in the picture below, and reassembled in the reverse order.



3.6 Connecting pipes

Connections

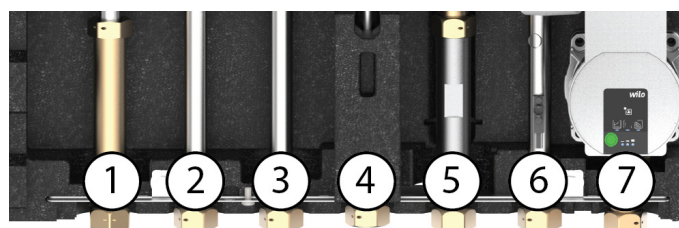
Connections to primary and secondary sides are all with 3/4" internal thread. Pipes are all Ø18 mm.

The rail that secures the pipes in the flat station is equipped with pictograms indicating the correct connection points for each component.

Torques for connections at the flat station

The nuts must be tightened to max. 8 Nm to avoid damaging the rubber gaskets.

This corresponds to tightening the nuts as firmly as possible by hand, followed by turning the nut less than half a rotation using a tool.



1. Domestic cold water supply
2. Domestic hot water
3. Domestic cold water return
4. Heat source supply (Primary)
5. Heat source return (Primary)
6. Heating supply (Secondary)
7. Heating return (Secondary)

3.7 Modification of cold water connection

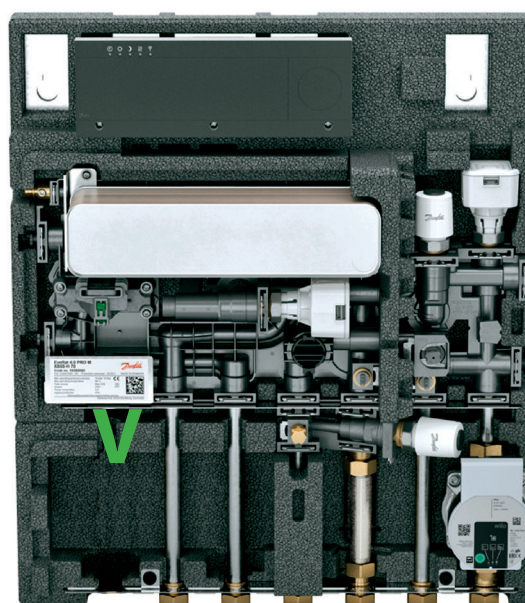
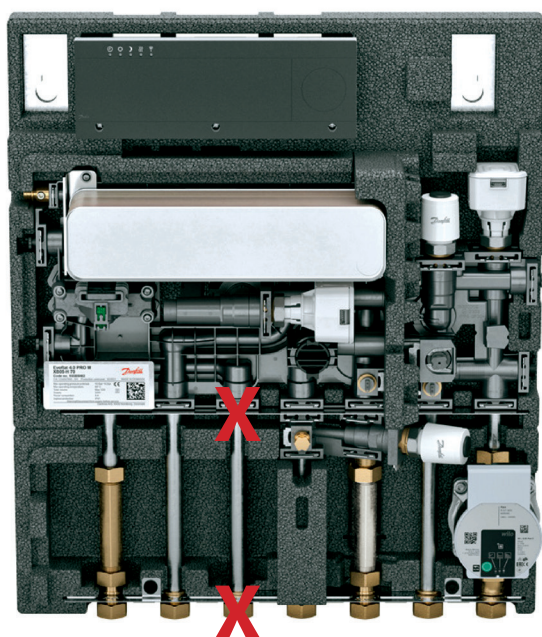
If it is desired not to route the cold water supply for the tap through the flat station, and the cold water outlet is therefore to be sealed with a plug, it is important to consider the risk of legionella bacteria.

In accordance with CEN 16355:2012, it is recommended to avoid stagnant water in empty pipes that are longer than twice their diameter, in order to prevent the formation of legionella.

We therefore recommend relocating the cold water inlet to the position where the cold water outlet would normally be, and sealing the original cold water inlet with a plug, which can be ordered from Danfoss under the following code number: 183B0593 (10 pieces i one bag).

X: We do not recommend to block the cold water outlet here

V: We recommend to move the cold water inlet and block the outlet here



4. Electrical connections

4.1 General

The EvoFlat 4.0 M PRO must be connected to 230V AC 50 Hz with earth. A 2.5-meter black cable without a plug is installed in the ECL220.

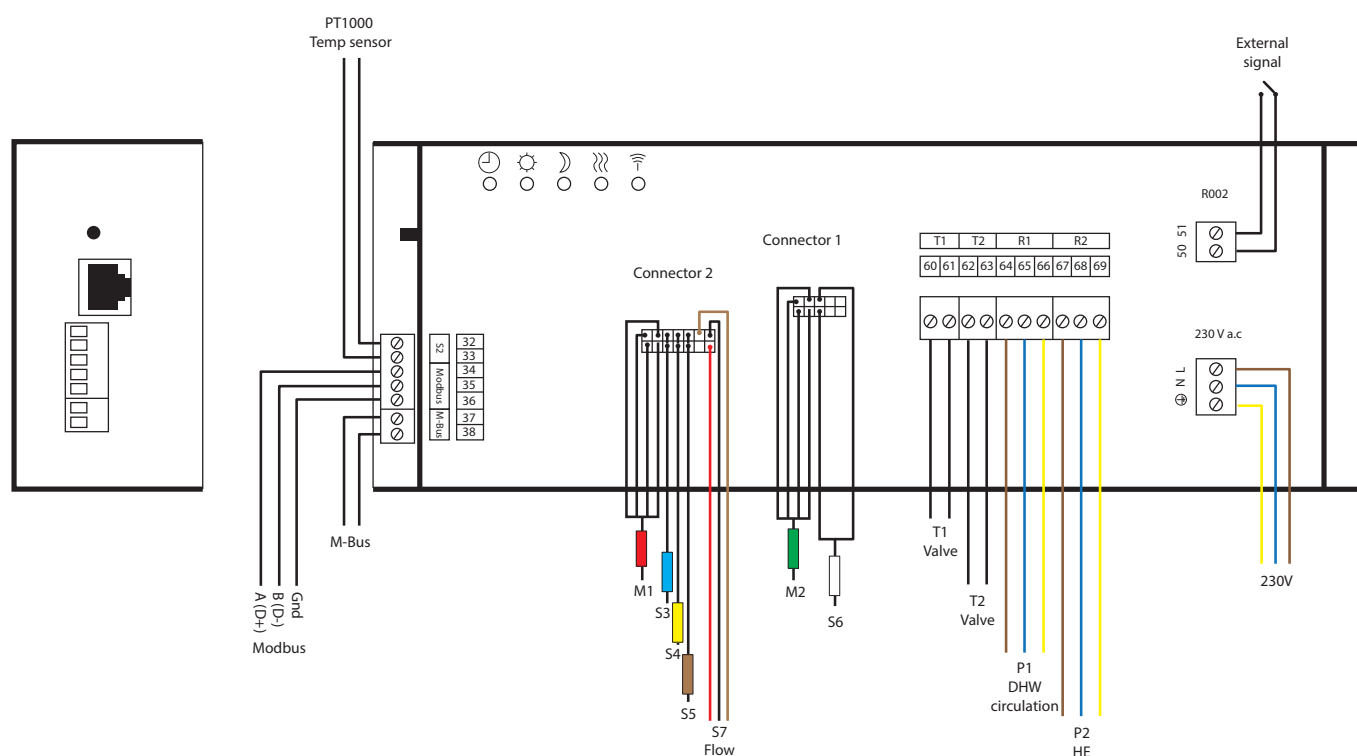
The cable is routed to the top of the station.



Authorized personnel only

Electrical work must be performed by qualified and authorized electrician only. Cables must be routed properly preventing damage due to sharp edges.

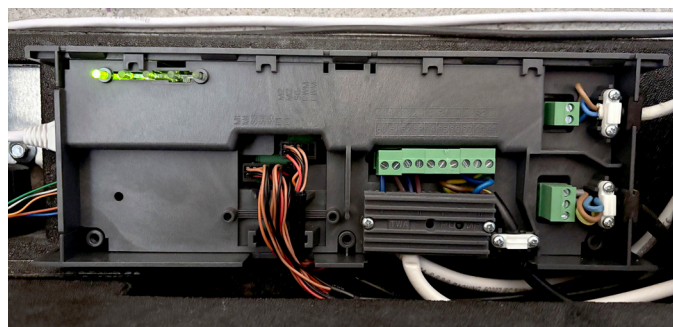
4.2 Wiring diagram



M1	Stepper motor DHW (32)
S3	Temperature sensor DHW (27 C)
S4	Temperature sensor heat source supply (27 A)
S5	Temperature sensor heat source return (27 B)
S7	Flow sensor DHW (58)
M2	Stepper motor heating (30)
S6	Temperature sensor heating supply flow (27 D)
T1	TWA bypass (40)
T2	TWA for zone valve (52A)*
P1	Circulation pump DHW (9)*
P2	Circulation pump for heating (10)
*Optional	

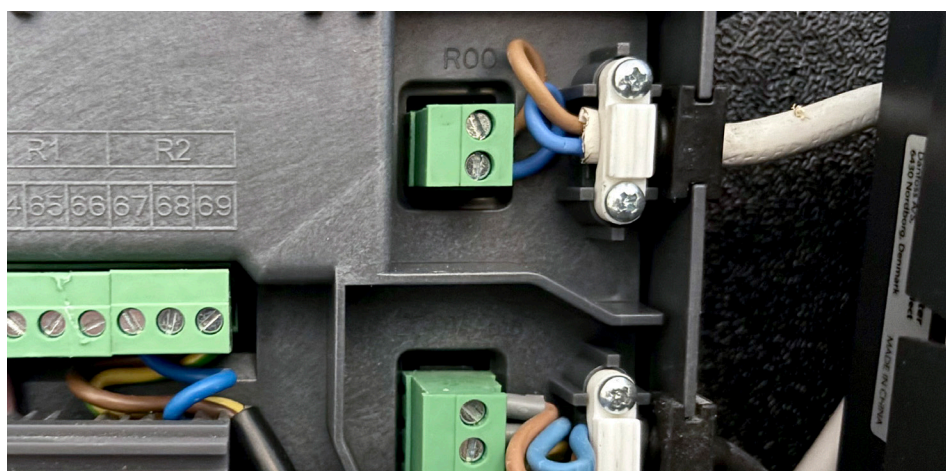
4.3 Open the ECL220 to get access

The cover of the ECL220 controller is secured by three screws located on the front. These screws can be removed using either a standard flat-head screwdriver or a Phillips screwdriver. Once the screws have been loosened, the cover can be removed by lifting it upwards from the bottom.



4.4 External signal (floor heating controller)

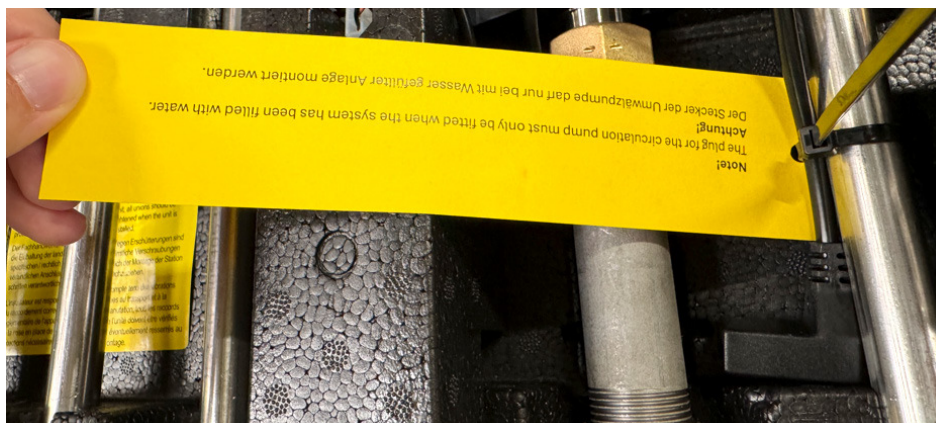
The underfloor heating circuits typically have their own controller, which can provide a potential-free signal indicating whether there is a demand for heating or not. This signal is connected to the ECL220 R002 input using a suitable cable.



4.5 Heating circulation pump

The cable for the circulation pump serving the mixing circuit is factory-connected to the ECL220 controller. However, the pump's plug is not inserted into the pump. This connection should only be made once the system is filled with water. If the pump operates without water, it will be damaged.

The plug is secured with a cable tie to the pipe for the mixing circuit, along with a note containing the above information.

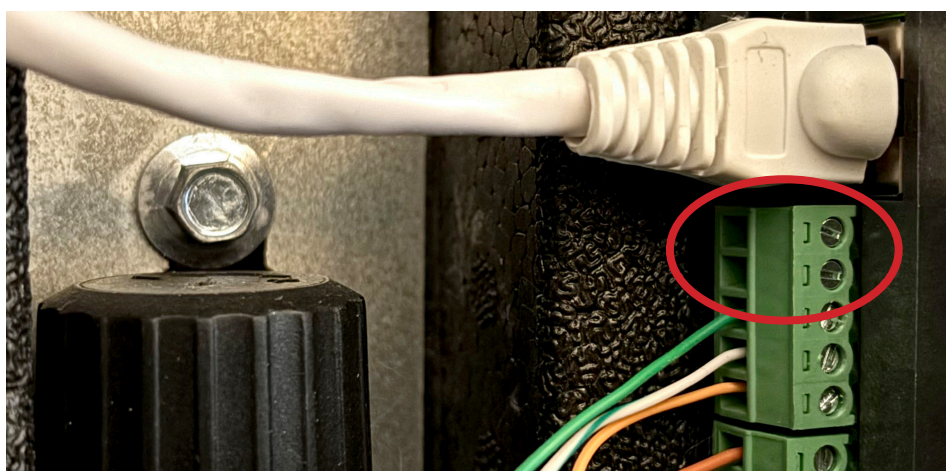


Circulation pump

Must be switched off until the system is filled with water.

4.6 Outdoor/Room temperature sensor

The supply flow temperature for the floor heating can, for example, be regulated based on the outdoor temperature or a reference room. If this is desired, the temperature sensors must be connected to the ECL220 controller at the top side of the unit, using a two-core cable. Refer to the wiring diagram if necessary.



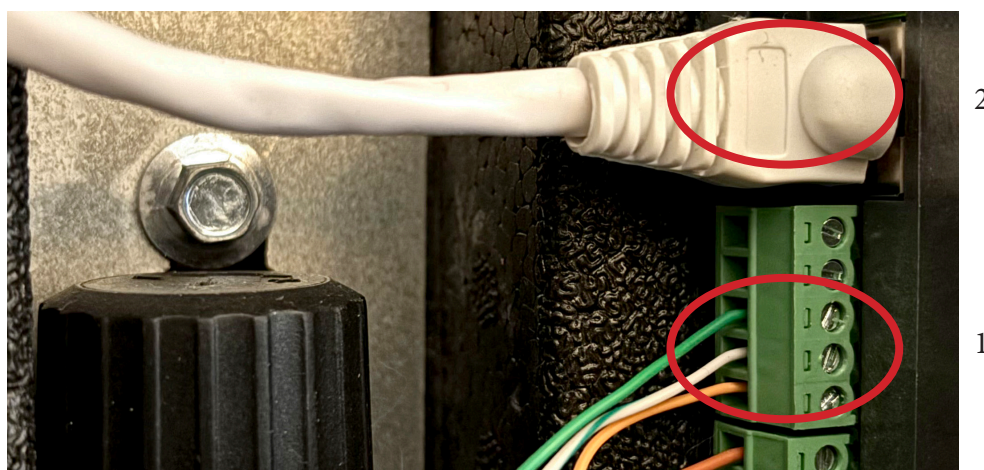
4.7 Sharing outdoor temperature sensor

It is possible to share an outdoor temperature sensor between multiple stations.

This can be achieved in the following ways:

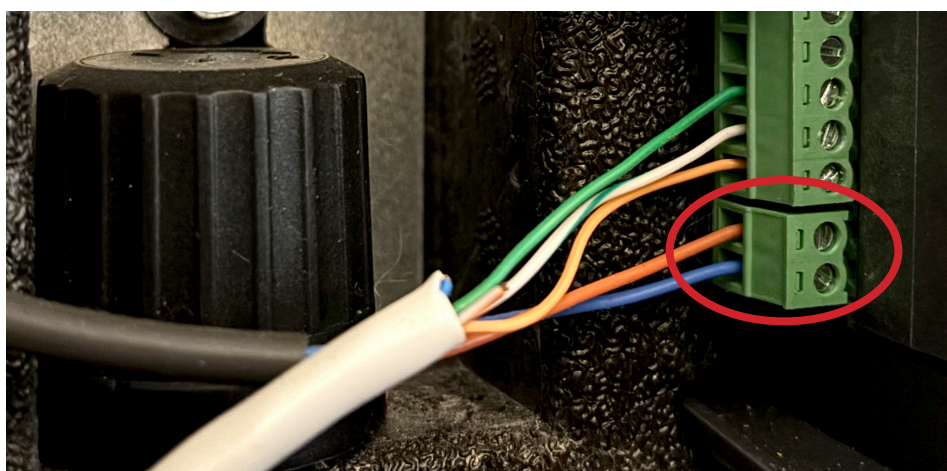
- Cable connection between individual stations via the Modbus connection (1)
- Via Modbus input (1)
- Via LeanHeat Monitor (2)

Refer to the wiring diagram if necessary.



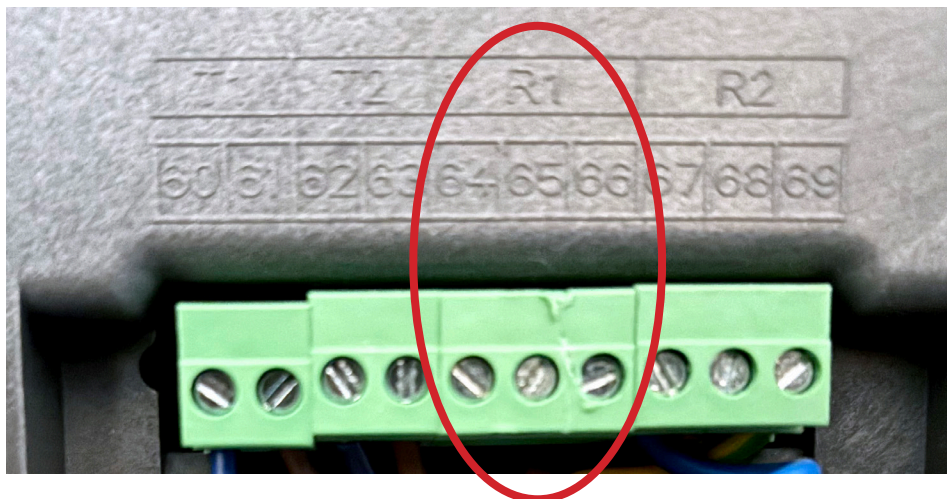
4.8 M-Bus connection

Up to five meters can be connected to the ECL220. These may include water meters, heat meters, electricity meters, or similar devices. They must be capable of communicating via M-Bus. The meters are connected on the left side of the controller. Refer to the wiring diagram if necessary.



4.9 DHW circulation pump

The DHW circulation pump is an accessory controlled by the ECL220. If it is to be connected, the pump's 230 V cable should be attached to the ECL220 at terminal R1. It is important that the pump's plug is only inserted once the system is filled with water, as operating the pump without water may cause damage. Refer to the wiring diagram if necessary.



Circulation pump

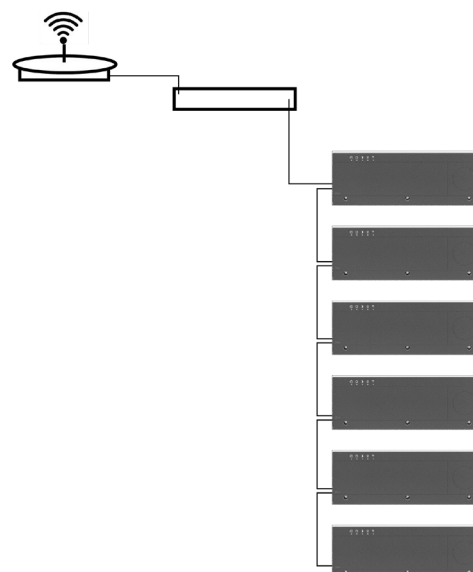
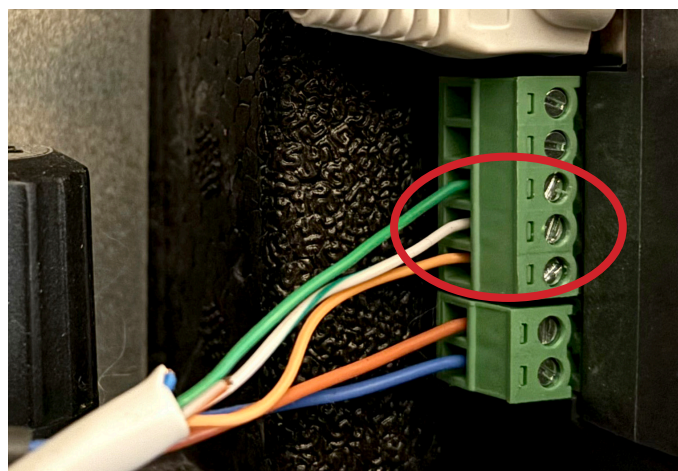
Must be switched off until the system is filled with water.

4.10 Modbus connection

The ECL220 offers an open Modbus protocol with access to all data and settings. Modbus RS485 is connected on the left side of the controller if integration with an external BMS system is desired.

The stations are connected in a daisy-chain configuration with 100 Ω end termination to a Modbus converter.

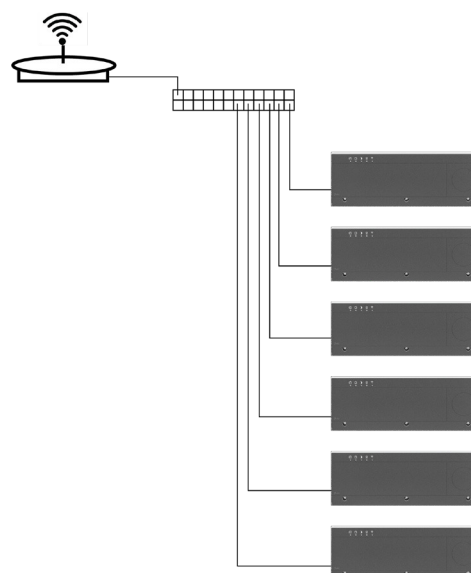
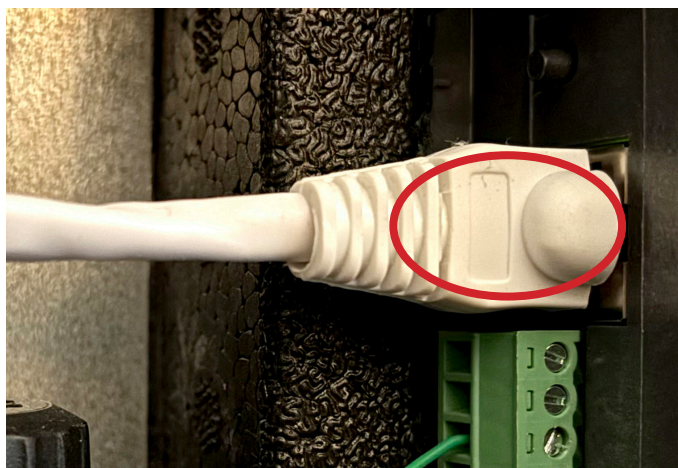
Refer to the wiring diagram if necessary.



4.11 Connection to Danfoss LeanHeat Monitor

If it is desired to connect the ECL220 to the Danfoss LeanHeat Monitor, this is done via the LAN connection on the left side. The LAN cable should be routed to a router with an internet connection. For multiple stations, the cable should be routed to a switch, which is also connected to a router with an internet connection.

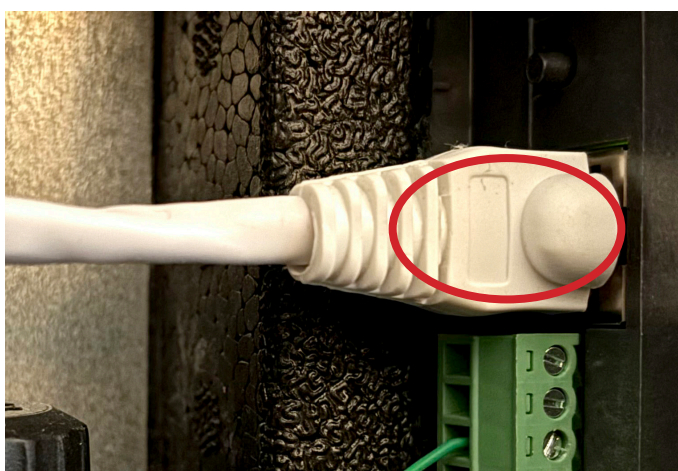
Refer to the wiring diagram if necessary.



4.12 Connection to Danfoss LeanHeat Monitor via gateway

If it is not possible to route a LAN cable through the building, Danfoss offers a gateway that can be connected to the individual stations. With a data SIM card, it is thereby possible to establish an online connection to the station, similar to using a standard router as described in section 4.11. The LAN-cable is connected to the gateway directly.

Refer to the wiring diagram if necessary.



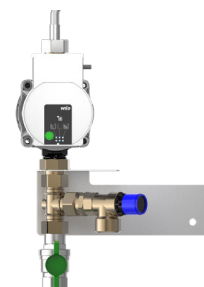
5. Installing accessories

5.1 Domestic hot water circulation set (DHW-C)

The DHW circulation set is supplied with a mounting bracket. This bracket is not used when installed in a Danfoss Recess Box.

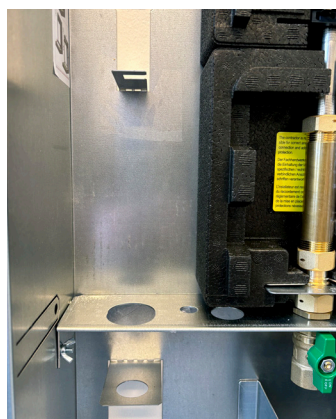
Below is an illustration of how the DHW circulation set is installed in a Danfoss Recess Box. The principle remains the same when connected in another manner and secured using the bracket.

Remember to install the supplied gaskets and O-rings to ensure a proper seal.



DHW circulation pump

Must be switched off until the system is filled with water.



There are two integrated brackets in the back plate of the Recess Box, which must be bent out.



The ball valve is mounted on the lower bracket.



The T-piece with the safety valve is mounted on the ball valve.



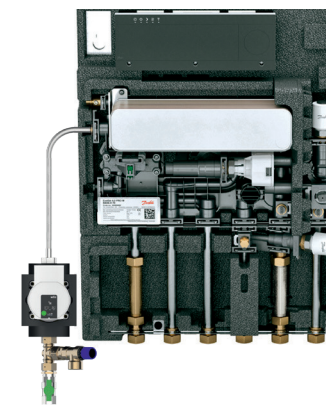
The circulation pump is mounted on top of the T-piece.



A piece of the EPP must be cut off where connecting to the station is. The clip is removed, and the plug for the DHW connection is taken out.



The hose is mounted on the pump and secured by the upper bracket. It is then installed in the station and fastened with the clip.



The completed installation is tightened and ready for further connections.



The power cable is connected to the ECL220 controller at the station, but the plug should only be inserted into the pump once the system is filled with water.

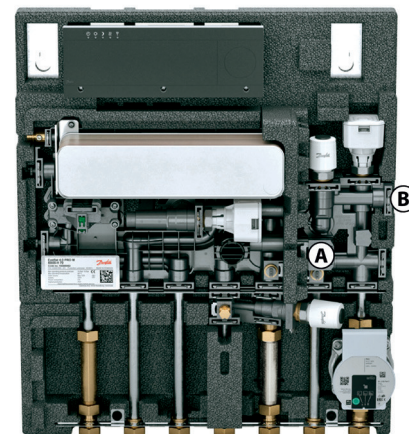
5.2 High temperature connection set (HTC)

If certain heat sources require a higher supply temperature than that provided by the mixing circuit – for example, a towel dryer or radiator – an HTC set can be installed, which can deliver the same temperature as the heat source provides.

The HTC set is connected to the flat station at two points, as shown in the photo.

A: Supply flow

B: Return flow



Below is an illustration of how the HTC set is installed in a Danfoss Recess Box. The principle remains the same when connected in another manner and secured using the bracket.



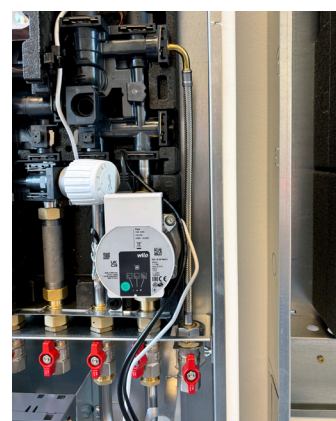
The HTC set is supplied with a bracket, which is not used when installed in a Recess Box.



There are two integrated brackets in the back plate of the Recess Box, which must be bent out.



A ball valve is mounted in the upper bracket.



The hose is mounted on the ball valve. At the station connection, the clip is removed and the plug is taken out. The hose is then mounted there, and the clip is reinstalled to secure the hose.



A ball valve is mounted on the lower bracket.



The hose is mounted on the ball valve. At the station connection, the clip is removed and the plug is taken out. The hose is then mounted there, and the clip is reinstalled to secure the hose.



A piece of the EPP must be cut off where connecting to the station is.

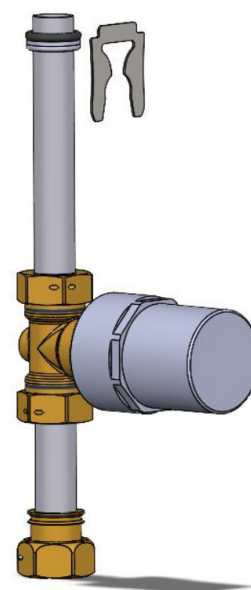
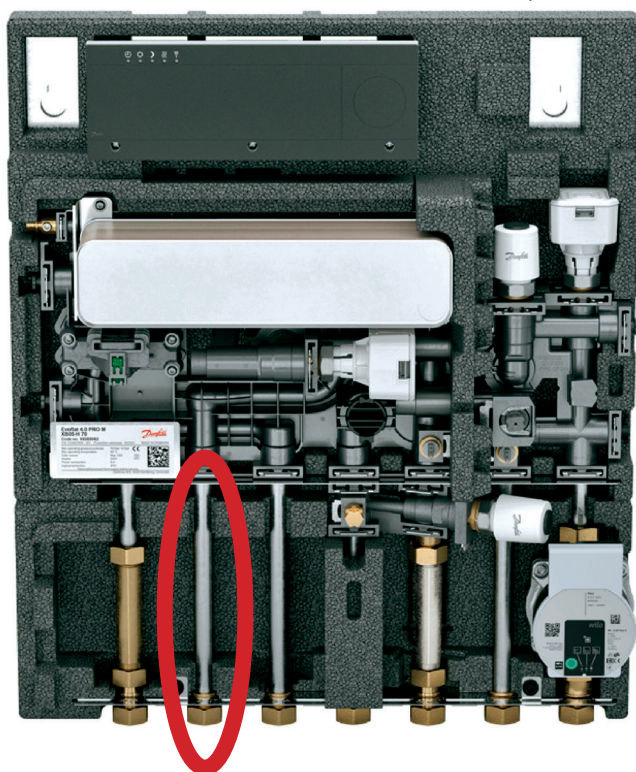
5.3 Water hammer arrestor (WHA)

The WHA must be installed at the domestic hot water supply. It is installed to prevent or reduce the effects of water hammer, a hydraulic shock that occurs when the flow of water is suddenly stopped or changed direction.

The water hammer arrestor is supplied as a set with pipes and clip.

1. If water in the system close all ball valves
2. Place a hose on the air vent
3. Reduce the pressure in the station by opening the air valve. Pressure is out when no more water is running out.
4. Remove the clip in the station for the DHW pipe
5. Remove the existing pipe by pulling it gently out
6. Secure that the old O-ring is pulled out
7. Tighten the T-piece of the WHA with the pipes before mounting it into the station
8. Make sure the delivered O-ring is mounted on the new pipe
9. Insert the new pipe with the WHA into the connection for DHW
10. Push the pipe into position and insert the clip delivered
11. Make sure the clip is pushed all in

The water hammer arrestor is now installed, and you can connect the DHW supply.

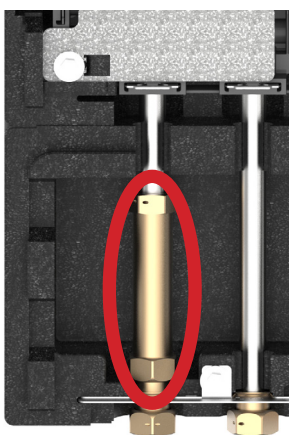


5.4 Water meter

The flat station is prepared for installing a water meter with a length of 110 mm, 3/4" internal thread, and pipes with a diameter of Ø18 mm.

1. If water in the system close all ball valves
2. Place a hose on the air vent
3. Reduce the pressure in the station by opening the air valve. Pressure is out when no more water is running out.
4. Loosen the nuts on the fitting piece
5. Remove the fitting piece
6. Install the water meter
7. Tighten the nuts to a maximum of 8 Nm

Note: When installing a water meter, the respective manufacturer's instructions must be observed.



5.5 Energy meter

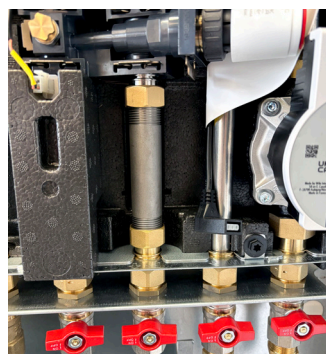
The flat station is prepared for installing a heat meter with a length of 110 mm, 3/4" internal thread, and pipes with a diameter of Ø18 mm.

Below we show how to install a Danfoss Sonos energy meter.

Note: When installing a heat meter, the respective manufacturer's instructions must be observed.



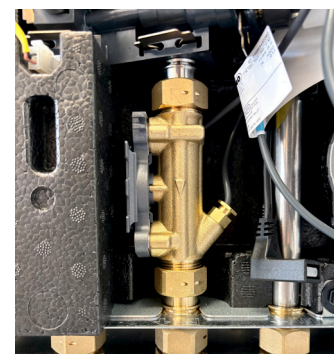
The energy meter is supplied with all wiring connected, and the corresponding gaskets are included.



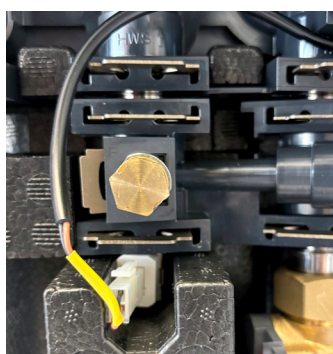
Please ensure that all ball valves are closed before removing the fitting piece at the location where the energy meter is to be installed.



To facilitate installation and protect the display, first secure the display to the bracket at the top of the station.



Install the meter section with the accompanying gaskets. Tighten to 8 Nm only.



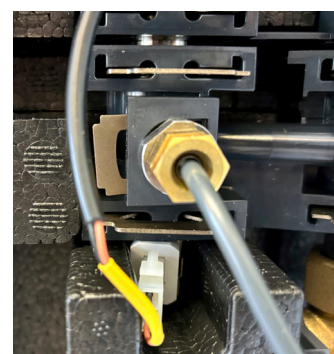
Remove the retaining clip that secures the plug in the energy meter's sensor pocket, then remove the plug.



Disassemble the plug. The steel component must be mounted onto the energy meter's temperature sensor.



Install the plug's steel component onto the temperature sensor as shown in the image.



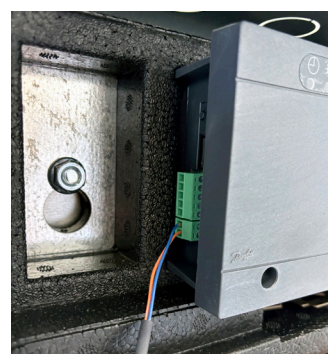
Then install the temperature sensor in the sensor pocket and secure it with the same retaining clip that held the plug in place.



Coil the excess cables as shown in the image and secure them with cable ties. This is important to prevent unwanted electrical noise.



Cable holders are provided for cables routed to the display.



Finally, connect the meter to the M-Bus input on the ECL220 controller.



The installation is complete, and the display can be easily read without the need to remove the cover.

6. Commissioning the flat station

Before commissioning can begin, it is essential to ensure that:

- The flat station is filled with water
- All electrical connections are properly installed and secured



Circulation pumps

Must be switched off until the system is filled with water.

6.1 Filling the flat station with water

Before commencing the water filling process, ensure following:

- All clips are fully pressed into place
- Tighten pipe connections (maximum torque: 8 Nm*)
- The circulation pump for underfloor heating is switched off
- The circulation pump for domestic hot water circulation is switched off (if installed)
- All ball valves are closed.

*Recommendation: Tighten the nut as much as possible by hand, then turn the nut an additional quarter turn using a suitable tool.

Procedure:

1. Carefully open the ball valves for the heat source supply and return, together with the ball valves for cold and hot water, allowing the station to fill slowly with water.
2. Then carefully open the ball valves for the underfloor heating supply and return, so that the underfloor heating circuit is filled. Ensure that all underfloor heating circuits are open.
3. Switch on the circulation pump for underfloor heating.
4. Switch on the circulation pump for domestic hot water circulation (if installed)

6.2 Venting the station

In new installations, there will almost always be air in the system that must be vented.

Air in the system can result in:

- No floor heating
- Domestic hot water not reaching the desired temperature
- In some cases, noise issues in the station

It is therefore essential to perform venting during commissioning and again shortly afterwards.

Venting procedure:

1. Loosen the screw by turning it a quarter turn
2. Allow the air to escape
3. When water begins to flow out, that station is vented, and tighten the screw again



6.3 Strainer cleaning

In new installations, dirt in the system will often accumulate in the filter. It is therefore important to clean the filter before starting commissioning to ensure sufficient flow in the system.

Procedure:

1. Close both ball valves for the heat source and heating
2. Place a hose on the air vent
3. Reduce the pressure in the station by opening the air valve. Pressure is out when no more water is running out.
4. Open the filter by turning it counterclockwise

Note: Do not use tools to open the filter

5. Remove the filter and rinse it under running water

Note: If the filter is heavily soiled, it is recommended to replace it with a new one, which can be ordered under the Danfoss code number: 183B0515

6. Reinsert the filter into the station and turn it clockwise until it is securely in place

7. Open the ball valves.

By new installations it is recommended to clean the strainer again shortly afterwards.

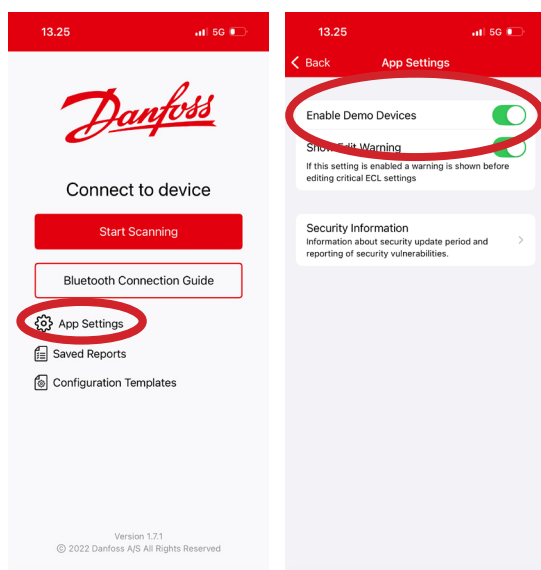


6.4 ECL Go app

The EvoFlat 4.0 M PRO flat station is a fully electronic flat station configured via the Danfoss ECL Go app. When the station is powered on, it must be commissioned, during which it is necessary to determine how the supply temperature should be regulated, and if a floor heating controller is connected.

The ECL Go app can be freely downloaded from the Apple App Store or the Google App Store, depending on the phone or tablet being used.

When the ECL Go app is opened, navigate to the app settings and disable Demo Devices, as their appearance during device searches may cause some confusion.

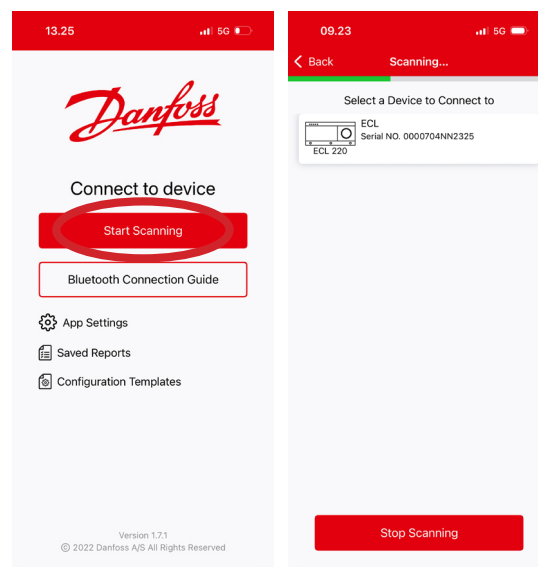
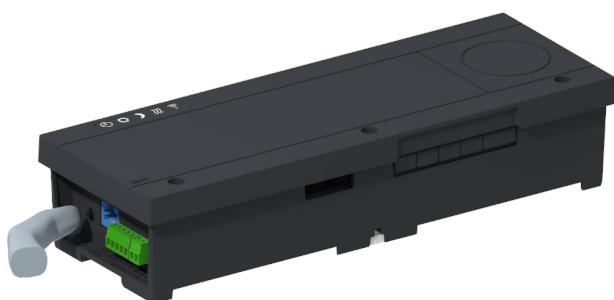


6.4.1 Connect ECL Go to ECL220 via bluetooth

When the station is powered on for the first time, a lamp will illuminate steadily in white, indicating that it has not yet been commissioned.

To connect the ECL Go app to the ECL220, Bluetooth must first be activated in the ECL220 controller. This is done by pressing the button located at the top left side of the controller and holding it until a blue lamp begins to blink.

Afterwards, select Start Scanning, and the ECL220 controller can then be chosen from the displayed list.



6.4.2 Choose regulation mode

Once the Bluetooth connection has been established, a notification will appear indicating that the system has not been commissioned.

You will be presented with two options: either press Next or Commission using a template. The template option should only be selected if such a template has been created during a previous commissioning process.

Next, a decision must be made regarding how the supply temperature in the underfloor heating system should be regulated.

The ECL220 controller offers four options:

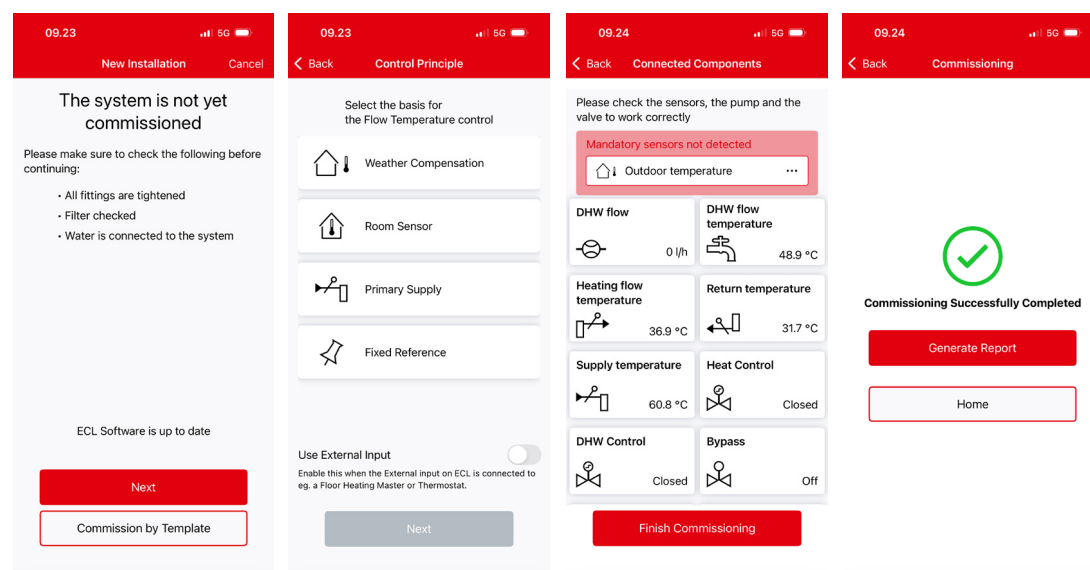
- **Weather-compensated** (based on outdoor temperature)
- **Room sensor** (based on a reference room)
- **Primary supply** (offset temperature)
- **Fixed supply temperature**

Subsequently, it must be specified whether there is an external input, **typically an external underfloor heating control**, that indicates whether there is a heating demand or not.

The next screen displays all connected components, such as temperature sensors, valves, and pumps. If any components are missing, this will be indicated in a red box. This may occur if the component has not yet been connected or if there is a fault in the connection.

It is also possible to verify whether the components are functioning correctly—for example, checking if the temperature sensors display accurate values and whether the valves can open and close.

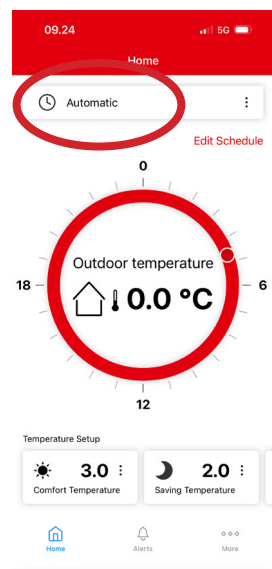
Once the test is completed, proceed to the next page, where you can either generate a commissioning report or return to the home screen. It is only meaningful to generate a commissioning report if all settings have been loaded via a template. Otherwise, return to the home screen and make the necessary adjustments before generating a commissioning report.



6.4.3 ECL Go homepage

On the home screen, there is a considerable amount of information that is not relevant to the ECL220. It is important to ensure that the controller is set to automatic operation.

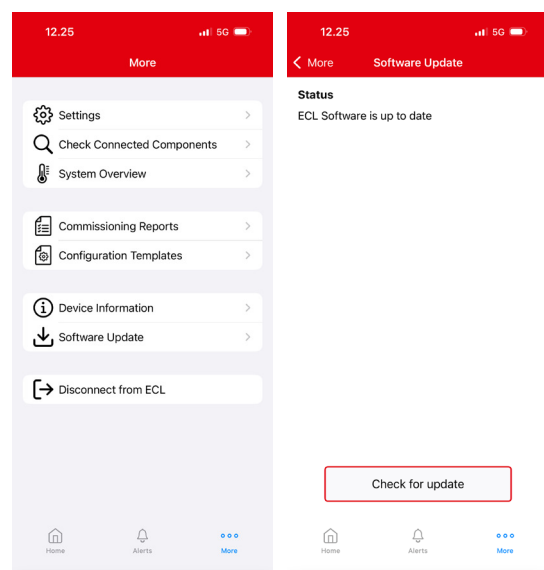
To access the settings, press “More” located at the bottom right corner.



6.4.4 Software update

The EvoFlat 4.0 M PRO is always manufactured with the latest software update. However, if the unit has been stored for an extended period at Danfoss or with a distributor, a newer version may have been released.

It is therefore essential to verify whether the installed software version is the most recent. Press “Check for update”, and if a newer software version is available, the update process will begin. This may take several minutes to complete.



6.5 Basic settings

Once regulation mode has been completed, attention should be given to the various settings. For the vast majority of installations, the factory settings will be appropriate, and no changes will be required.

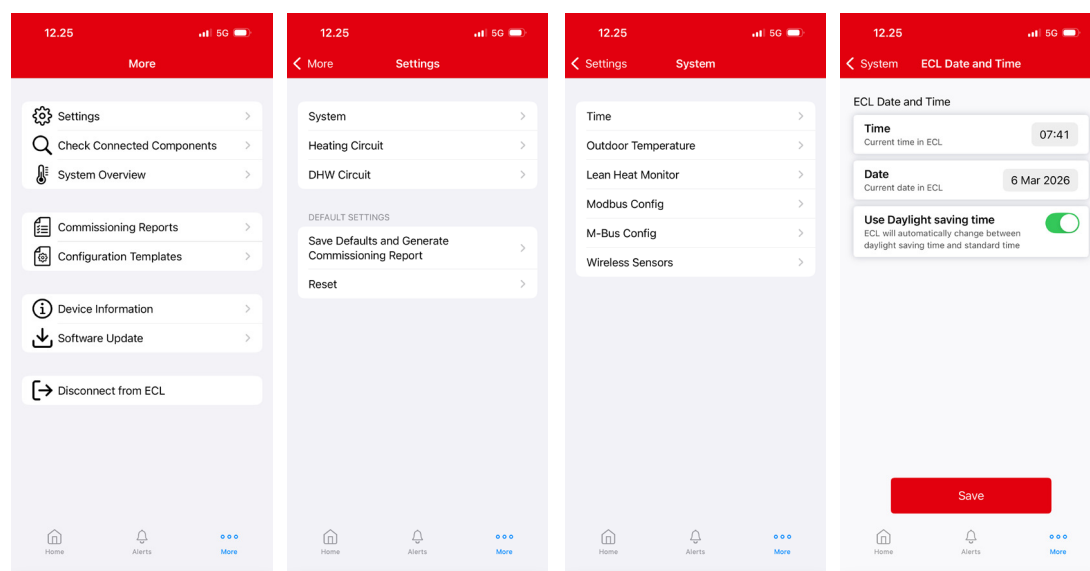
In the following sections, we will review the most fundamental settings that must be considered during commissioning.

A software manual is available, which provides a much more detailed description of the options offered by the control system.

6.5.1 Set time and date

The first setting to configure is the time and date. It is important to set these correctly, as this information can be valuable for future operational optimization or, for example, when troubleshooting the station.

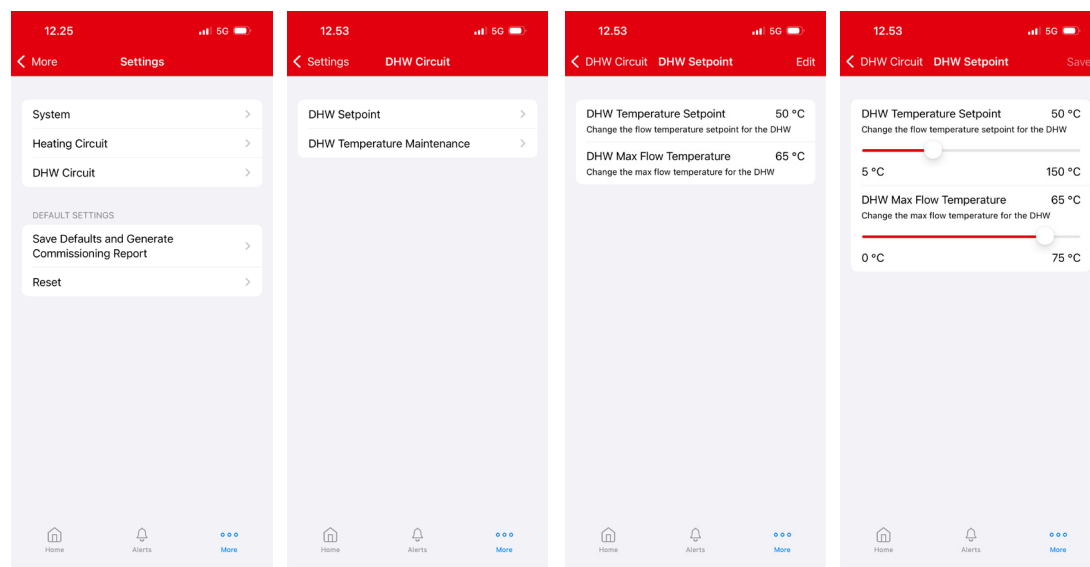
Change time and date: Settings / System / Time



6.5.2 Set DHW temperature

The domestic hot water temperature is factory-set to 50 °C, measured immediately after the heat exchanger.

Change DHW temperature: Settings / DHW Circuit / DHW setpoint



6.5.2.1 Activate summer bypass function

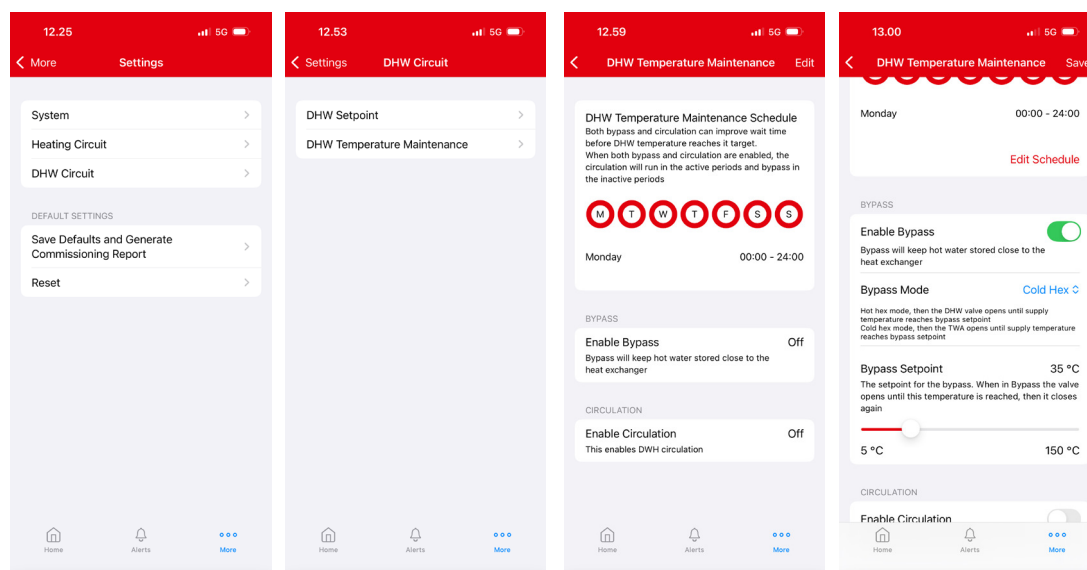
The summer bypass function is factory-deactivated and must therefore be activated if you wish to use it.

You can choose between two different bypass modes:

- Cold HEX: The heat supply does not pass through the station.
- Warm HEX: The heat supply passes through the heat exchanger, keeping it slightly warm.

The bypass setpoint determines the supply temperature that should be maintained.

Activate summer bypass: Settings / DHW Circuit / DHW Temperature Maintenance

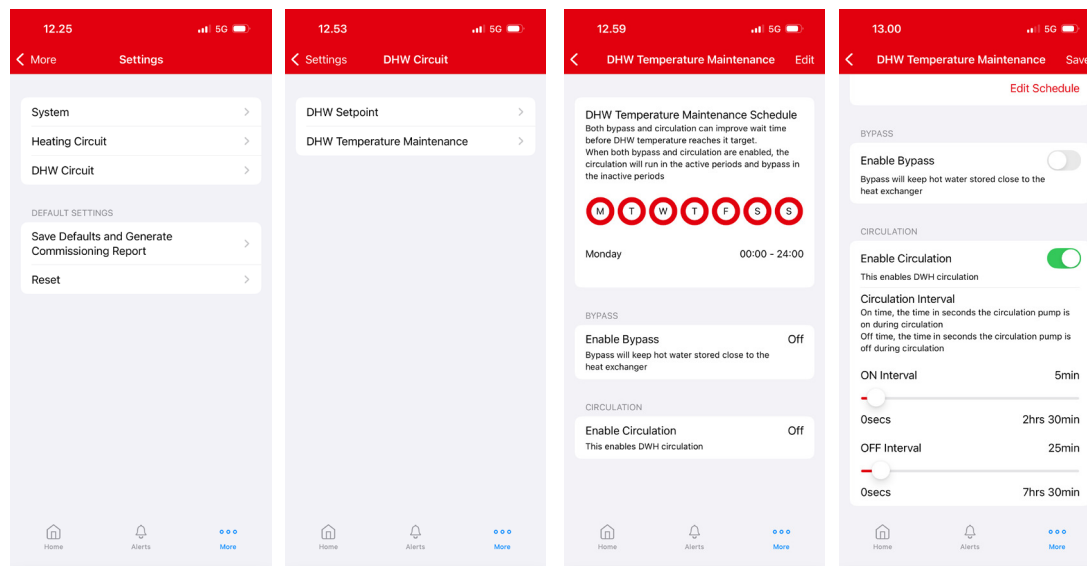


6.5.2.2 Activate DHW circulation

If the DHW circulation accessory is connected, it must also be activated.

It is possible to configure both the duration for which the circulation should run at a time and the length of the pauses between operation cycles.

Activate DHW circulation: Settings / DHW Circuit / DHW Temperature Maintenance

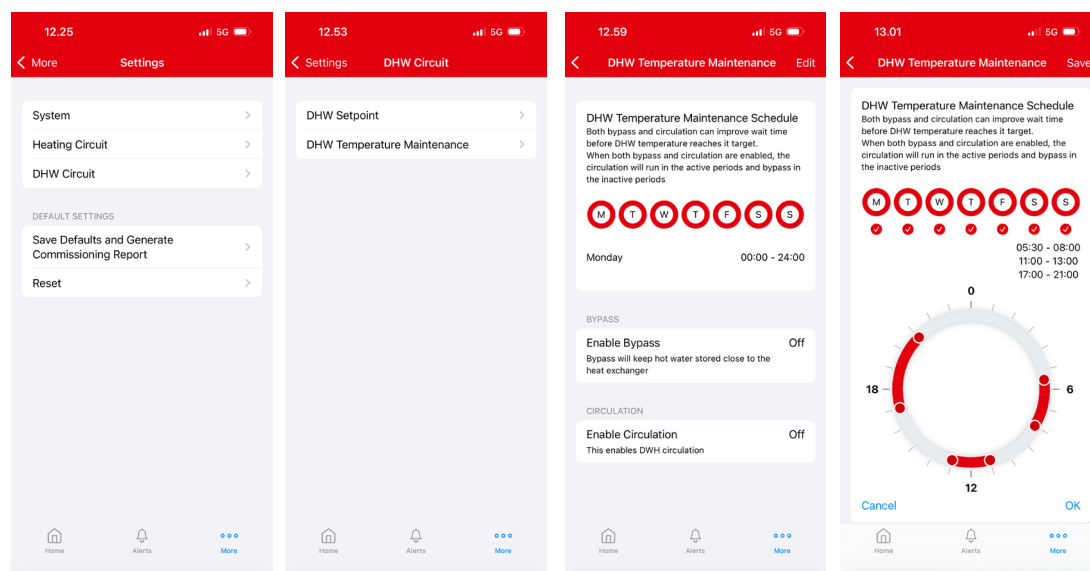


6.5.2.3 Time schedule for temperature maintenance

One way to save energy is to create a schedule for when the bypass and/or DHW circulation functions are active. You can set one three periods per day, individually for each day of the week.

If both the summer bypass and DHW circulation functions are activated, the DHW circulation will operate during the selected periods, while the bypass will run outside of these periods.

Activate DHW week schedule: Settings / DHW Circuit / DHW Temperature Maintenance



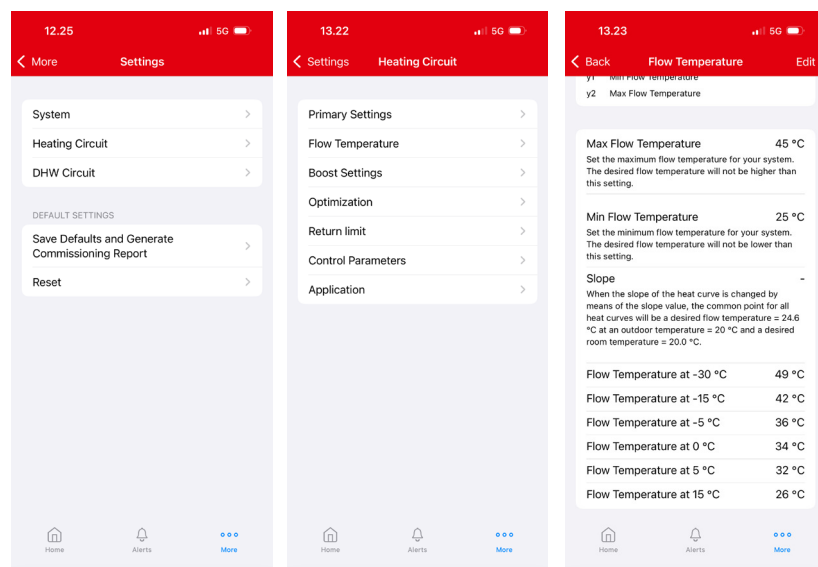
6.5.3.1 Heating supply flow temperatur - Weather compensated

The maximum supply temperature (factory setting: 45 °C) and minimum supply temperature (factory setting: 25 °C) can be adjusted.

Slope refers to predefined control curves. For underfloor heating, it is recommended to select a slope of 0.6.

It is also possible to create a custom control curve by adjusting the supply temperatures for individual outdoor temperatures.

Set supply flow temperature weather compensated: Settings /Heating Circuit / Flow Temperature

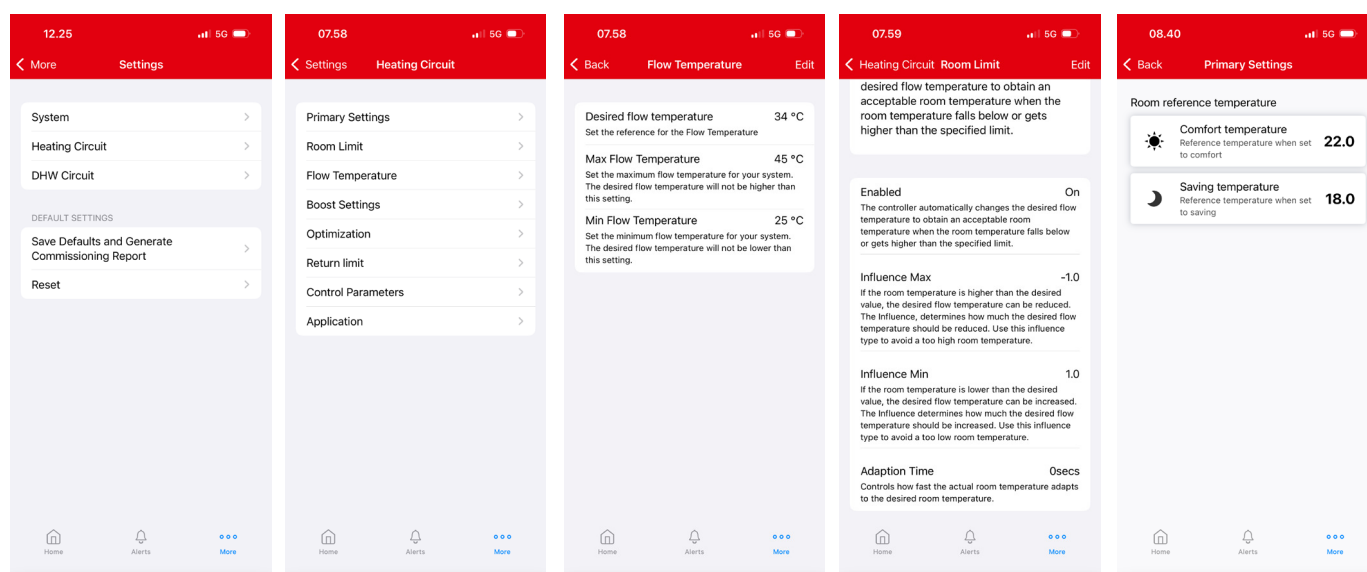


6.5.3.2 Heating supply flow temperatur - Room sensor

The maximum supply temperature (factory setting: 45 °C) and minimum supply temperature (factory setting: 25 °C) together with wanted supply flow temperature (factory setting: 34 °C) can be adjusted.

For room control, there is an additional menu item called "Room Limit." This setting determines the extent to which the supply flow temperature should be adjusted, depending on whether the room temperature is above or below the desired temperature, as well as the speed at which the adjustment should be made.

Set supply flow temperature reference room: Settings / Heating Circuit / Flow temperature - Room Limit - Primary Settings

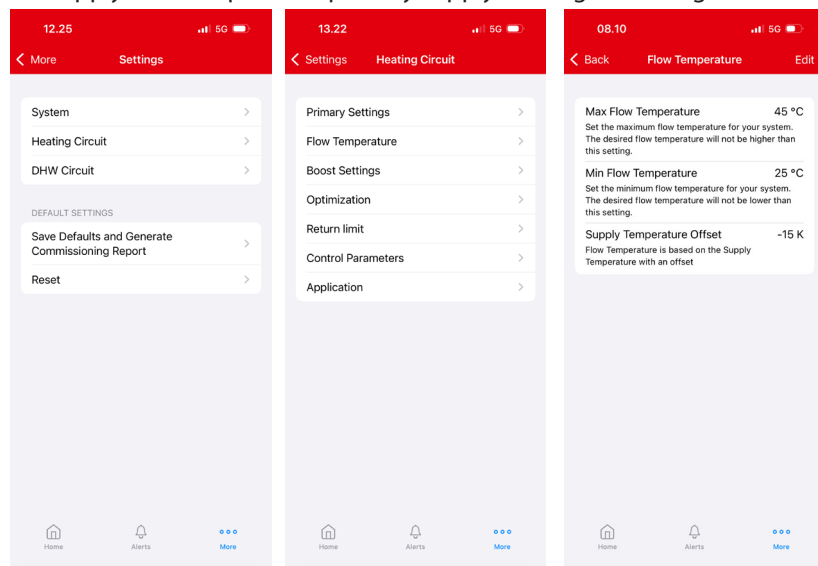


6.5.3.3 Heating supply flow temperature - Primary supply

The maximum supply temperature (factory setting: 45 °C) and minimum supply temperature (factory setting: 25 °C) can be adjusted.

Next, the offset temperature is set (factory setting: -15 K), meaning that the supply temperature is 15 K lower than the supply temperature of the heating source.

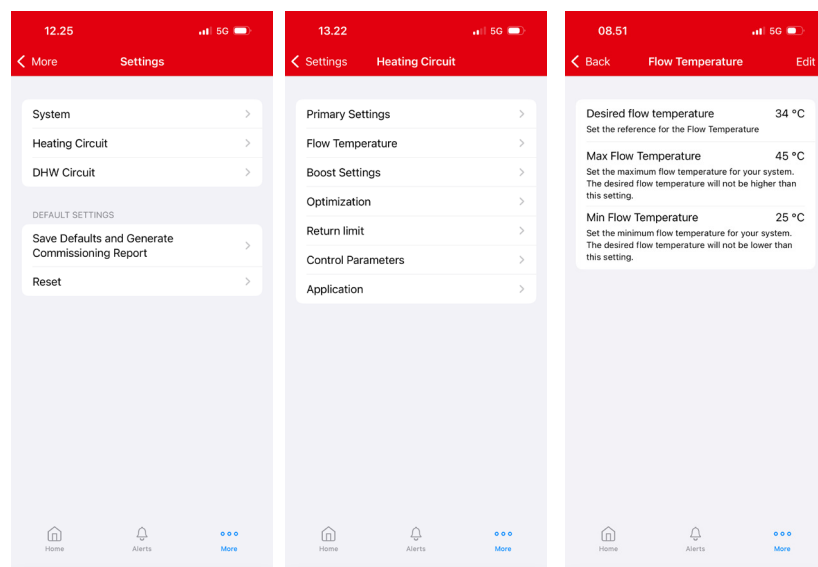
Set supply flow temperature primary supply: Settings / Heating Circuit / Flow Temperature



6.5.3.4 Heating supply flow temperature - Fixed supply temperature

The maximum supply temperature (factory setting: 45 °C) and minimum supply temperature (factory setting: 25 °C) together with wanted supply flow temperature (factory setting: 34 °C) can be adjusted.

Set fixed supply flow temperature: Settings / Heating Circuit / Flow Temperature



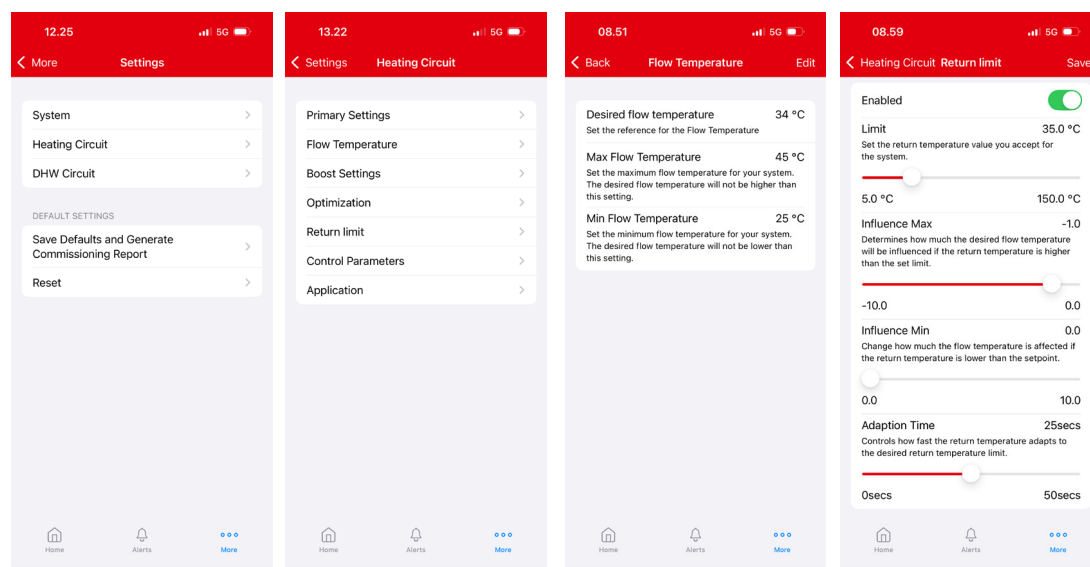
6.5.4 Return temperature limiter

If it is desired to ensure a low return temperature, this function must be activated.

In this setting, the maximum return temperature is defined (factory setting: 35.0 °C).

- Influence Max: For each degree that the return temperature exceeds the desired temperature, the supply temperature is reduced by the specified value (factory setting: -1.0).
- Influence Min: For each degree that the return temperature is below the desired temperature, the supply temperature is increased by the specified value (factory setting: 0.0).
- Adaption Time: Determines how quickly the control system should adjust (factory setting: 50 seconds).

Set fixed supply flow temperature: Settings / Heating Circuit / Return limit



6.5.5 Pump post-run

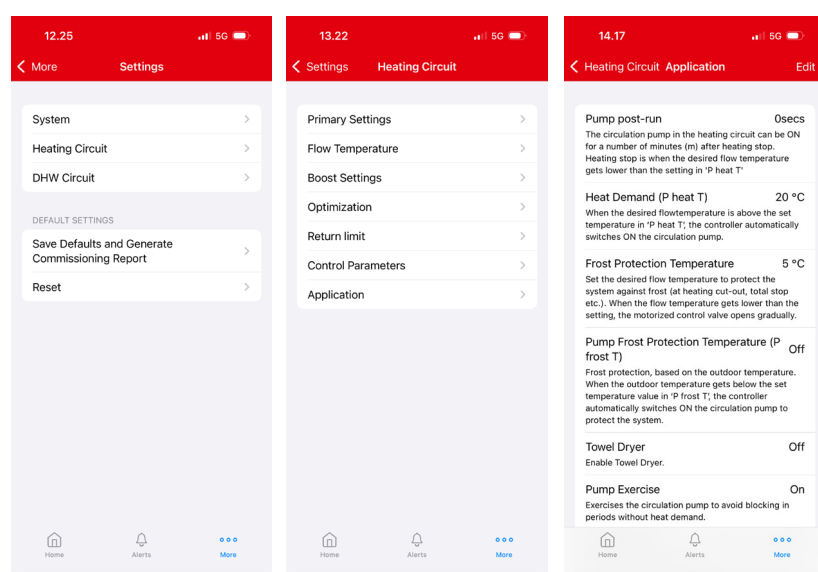
When there is no longer a heating demand, the thermal actuators close slowly. It may take up to 3 minutes before they are fully closed. During this time, the circulation pump must continue running.

In some cases, this is controlled by the underfloor heating control system, so it is important to understand how it operates:

ICON – does not control the closing of the thermal actuators; therefore, the pump post-run should be set to 3 minutes.

ICON2 – controls the closing of the thermal actuators itself; therefore, the pump post-run should be set to 0 minutes.

Set supply flow temperature fixed supply temperature: Settings / Heating Circuit / Application

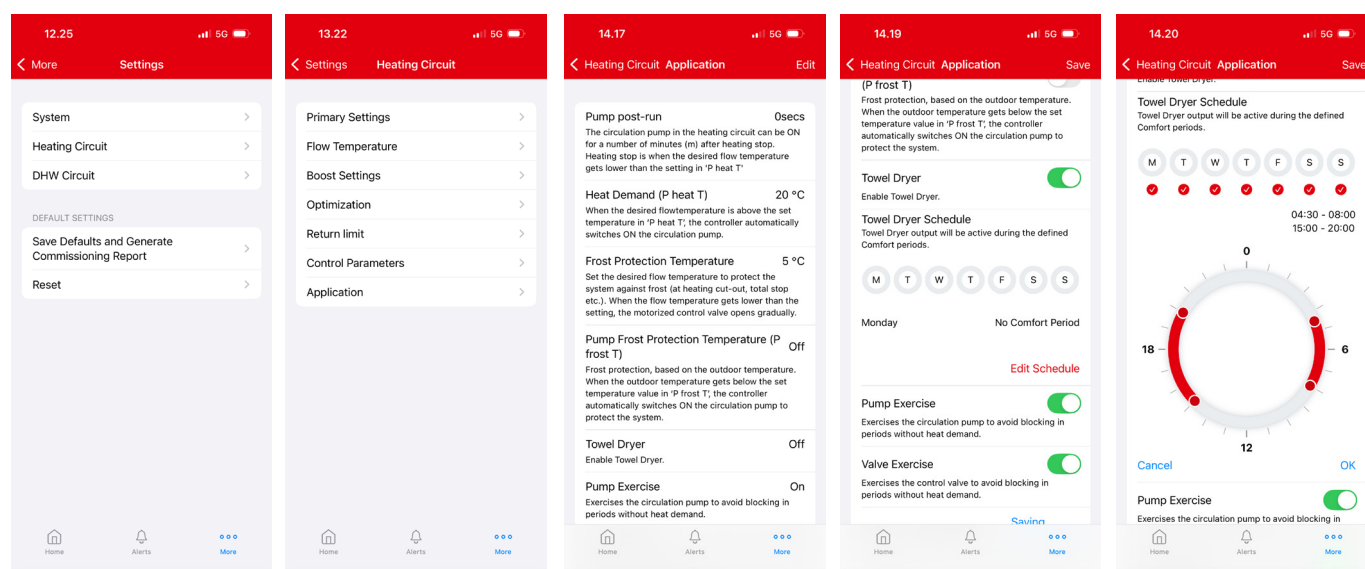


6.5.6 Towel dryer - High temperature connection (HTC)

A schedule can be created for the HTC connection, for example, if a towel dryer has been installed that does not need to operate all day. When the Towel Dryer function is activated, you can set one to three periods per day individually for each day of the week.

The weekly schedule operates when there is no heating demand; otherwise, the HTC connection runs continuously.

Activate Towel dryer schedule: Settings / Heating Circuit / Application



6.6 Oline connections

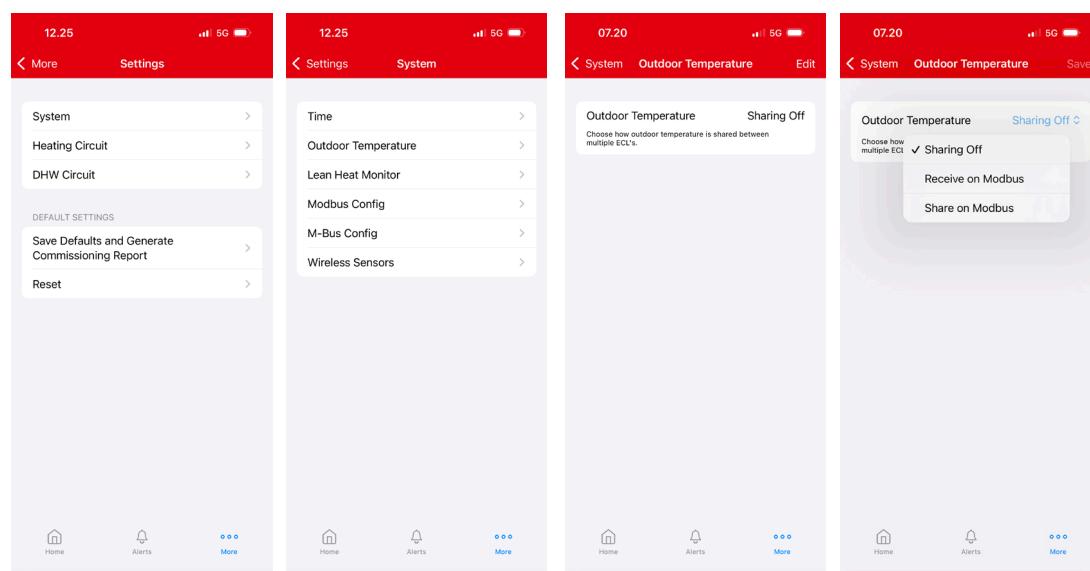
One of the major advantages of a fully electronic station is the possibility of online connectivity. The ECL220 offers various options that can be easily configured via the ECL Go app.

6.6.1 Share outdoor temperature via Modbus connection

It is possible to share an outdoor temperature sensor with other stations via the Modbus connection. The electrical connection is described in section 4.7.

The station equipped with the outdoor temperature sensor must be configured to “Share on Modbus”. All other stations receiving the outdoor temperature must be configured to “Receive on Modbus”.

Set outdoor temperature sharing: Settings / System / Outdoor Temperature

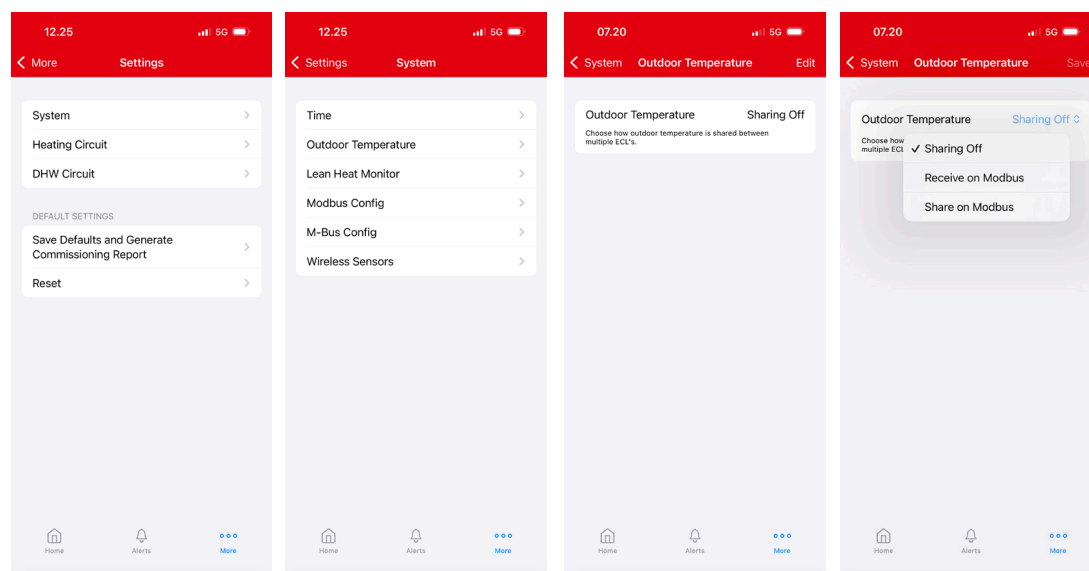


6.6.2 Write outdoor temperature via Modbus RS485

If the station is connected to an external BMS system and the system can register the current outdoor temperature, it can write to the station via Modbus RS584 and communicate the outdoor temperature. This must be done every time within a 3-minute interval.

The station must be configured to “Receive on Modbus” in order to receive the signal.

Set outdoor temperature sharing: Settings / System / Outdoor Temperature

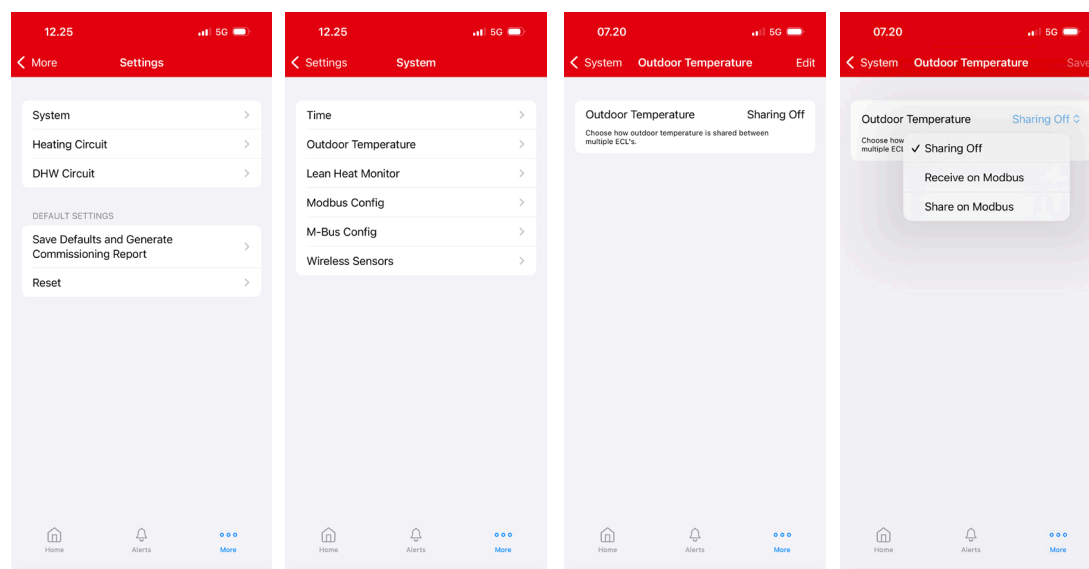


6.6.3 Share outdoor temperature via Danfoss LeanHeat Monitor

It is possible to share the outdoor temperature via Danfoss LeanHeat Monitor. One station has an outdoor temperature sensor installed and shares the data with the other stations through LeanHeat Monitor. In this way, it is possible to avoid running cables between the stations.

The station equipped with the outdoor temperature sensor must be configured to “Share on Modbus”. All other stations receiving the outdoor temperature must be configured to “Receive on Modbus”.

Set outdoor temperature sharing: Settings / System / Outdoor Temperature



6.6.4 Connect to Danfoss LeanHeat Monitor

If it has been decided that the station should be connected to Danfoss LeanHeat Monitor, this must be activated for the station via ECL Go.

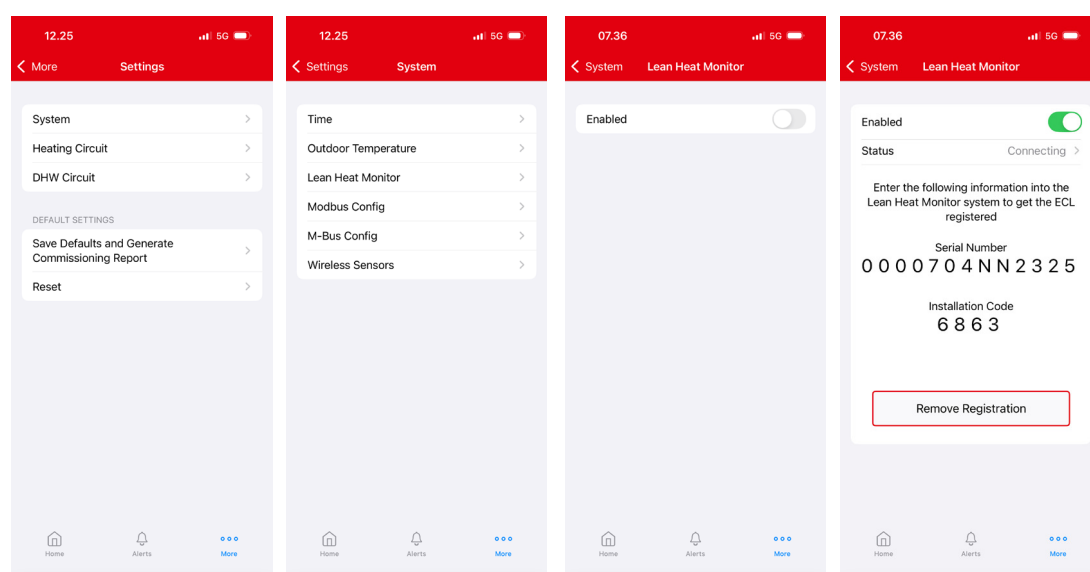
Once activated, two numbers will be generated, which must be recorded in relation to the associated residence:

- Serial number
- Installation code

These two numbers are used to connect the station in LeanHeat Monitor, and it is also necessary to know the reference to the residence.

Note: This setting can be configured even if the station is not yet connected to the internet. As soon as an internet connection is established, the station will connect automatically.

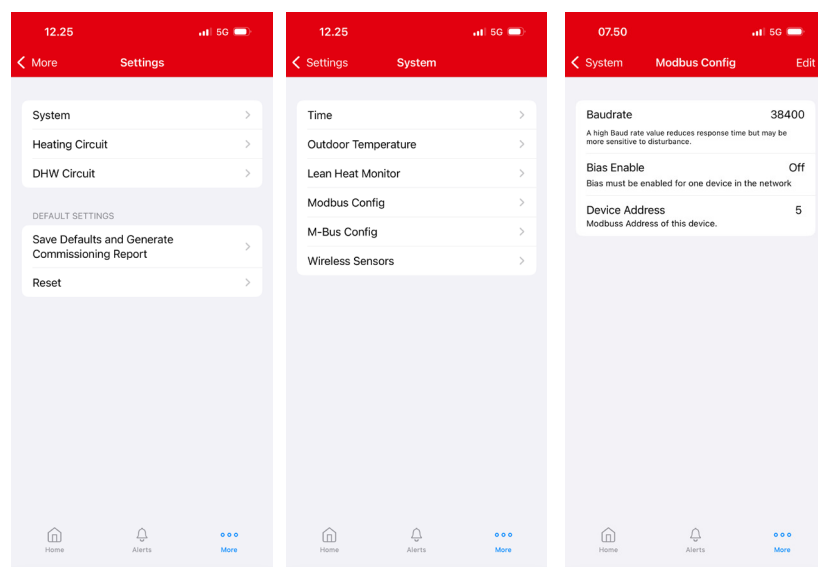
Activate LeanHeat Monitor: Settings / System / Lean Heat Monitor



6.6.5 Connection to external BMS system via Modbus RS485

The Modbus settings must be provided by the BMS company responsible for connecting the station.

Activate LeanHeat Monitor: Settings / System / Modbus Config



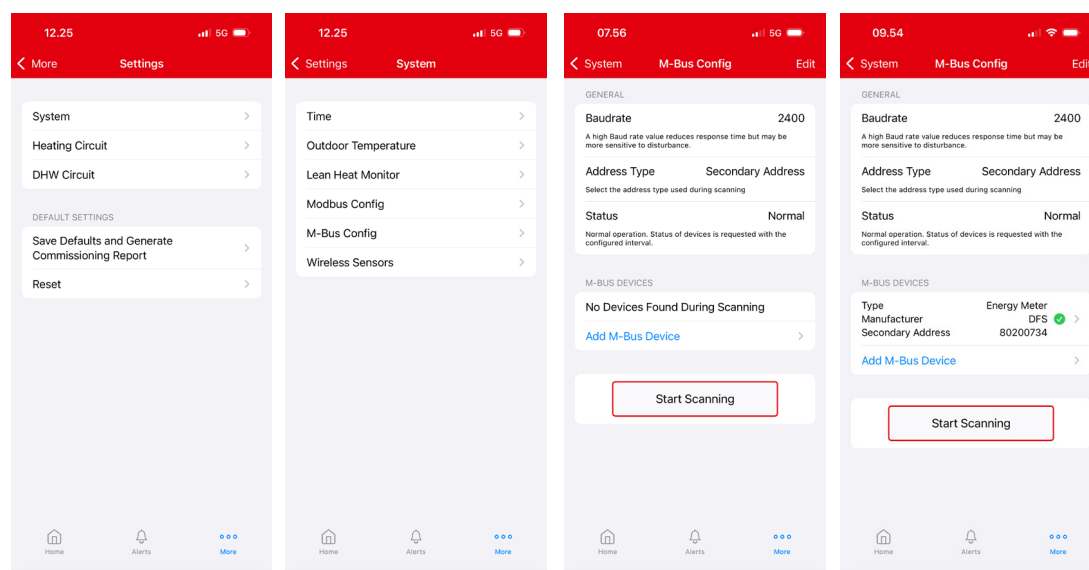
6.6.6 Setup M-Bus meters

It is possible to connect up to five M-Bus meters to the ECL220. The meters are linked to the ECL220 via the ECL Go app, where the following settings can be adjusted:

- Baud rate (factory setting: 2400)
- Address type (factory setting: Secondary)
- Reading interval (factory setting: 1 minute)

Initiate scanning, and the ECL220 will automatically search for connected devices. Once found, they will be displayed in the overview.

Connect M-Bus meeters: Settings / System / M-Bus Config

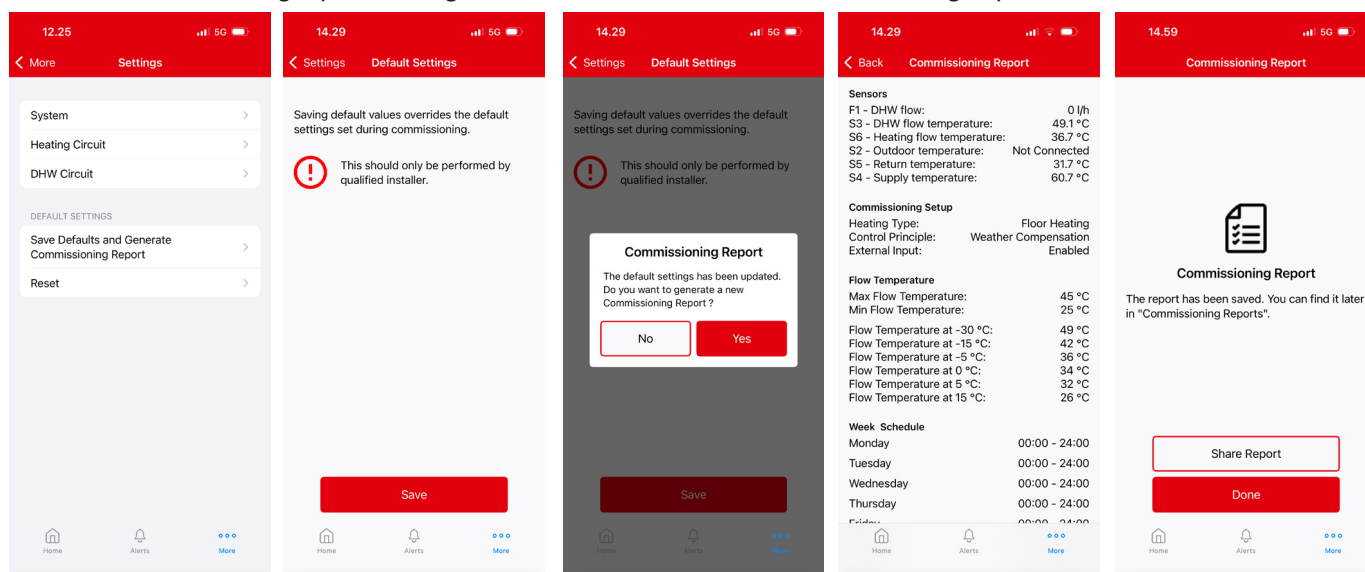


6.7 Generate a commissioning report

Once all settings have been configured, it is advisable to save them. When doing so, you will have the option to generate a commissioning report. If you choose to generate the report, you will first be presented with an overview of all settings, which will be included in the report. You can then add company information and details about the installation.

When finished, the report can be sent to relevant recipients using any of the available options on your phone. Alternatively, you can simply save it and send it later if necessary.

Generate a commissioning report: Settings / Save Defaults and Generate Commissioning Report

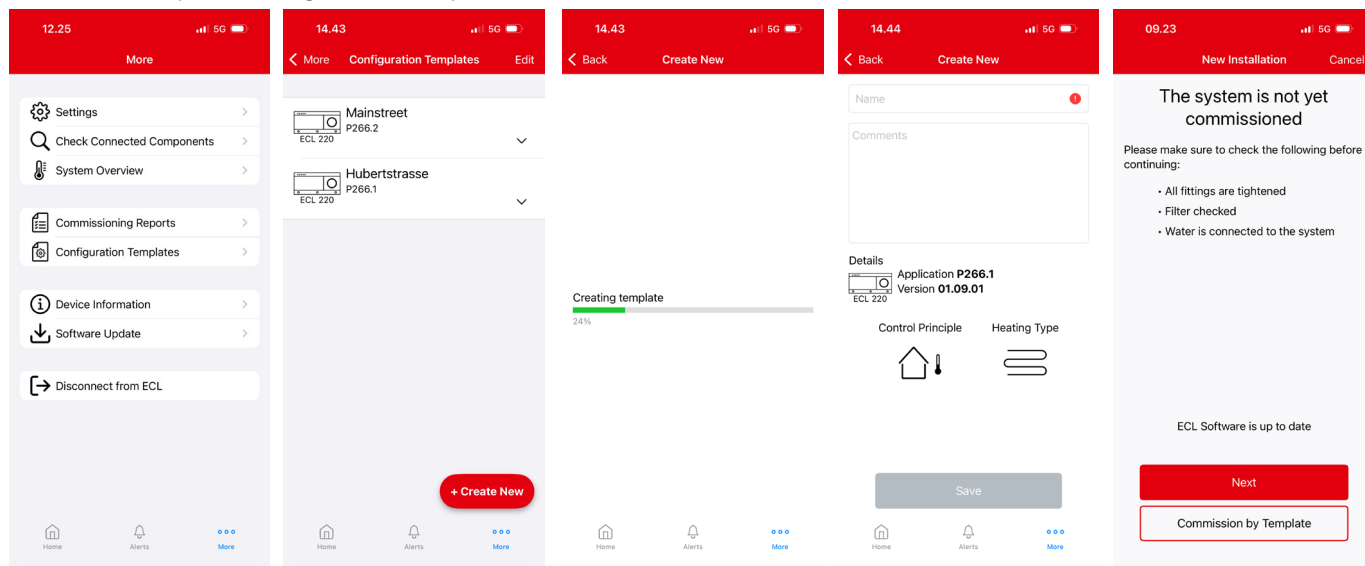


6.8 Generate a template

If you need to configure multiple stations with identical settings, it is advisable to create a template. When you access the menu, you will see an overview of all generated templates. Press "Create New" to create a template based on the settings of the station to which you are currently connected. The template should be given a name, and you may add remarks or notes to it.

The next time you start up a station, you can load the template right from the beginning, ensuring that all settings are configured in the same way. This approach can save a significant amount of time.

Generate a template: Configuration Templates



7 Check the station operation functions

7.1 General

An important part of commissioning a station is performing a functional check to ensure that the station operates as intended. The ECL Go app is a highly useful tool for this purpose, as it allows you to view all parameters and verify that the station is regulating correctly.

7.2 System overview

The system overview provides an overview of the current status:

Heating

S4: Displays a heat source supply temperature of 61.2 °C

S5: Displays a heat source return temperature of 31.7 °C (Return limit temperature 35 °C)

S6: Displays supply flow temperature floor heating of 30.5 °C (desired temperature 35.2 °C)

Pump: Circulation pump floor heating is On

T2: Zone valve is open

M2: Stepper motor with valve indicates that the heating control valve is 12% open

Ext. Input: Indicates that there is a heating demand (ON)

DHW

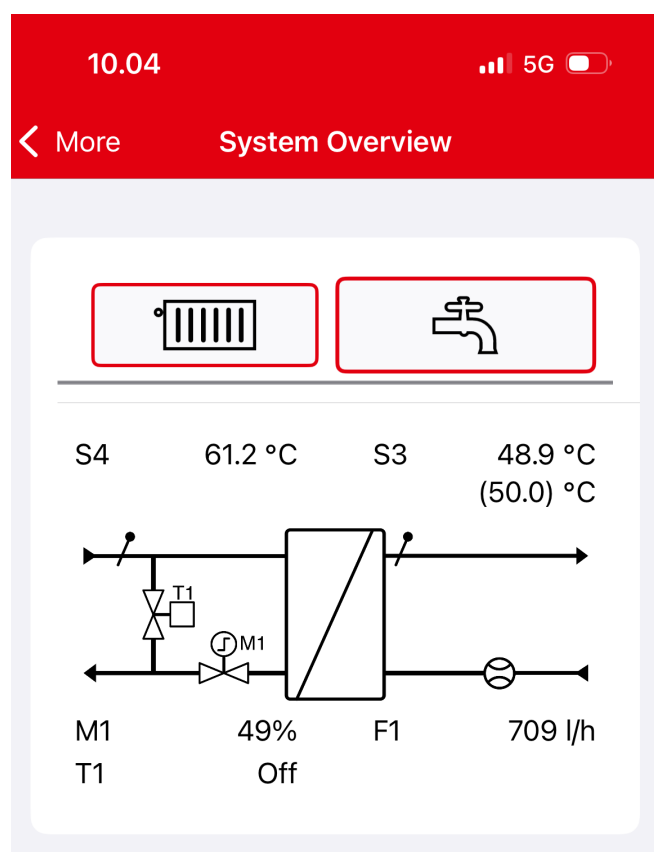
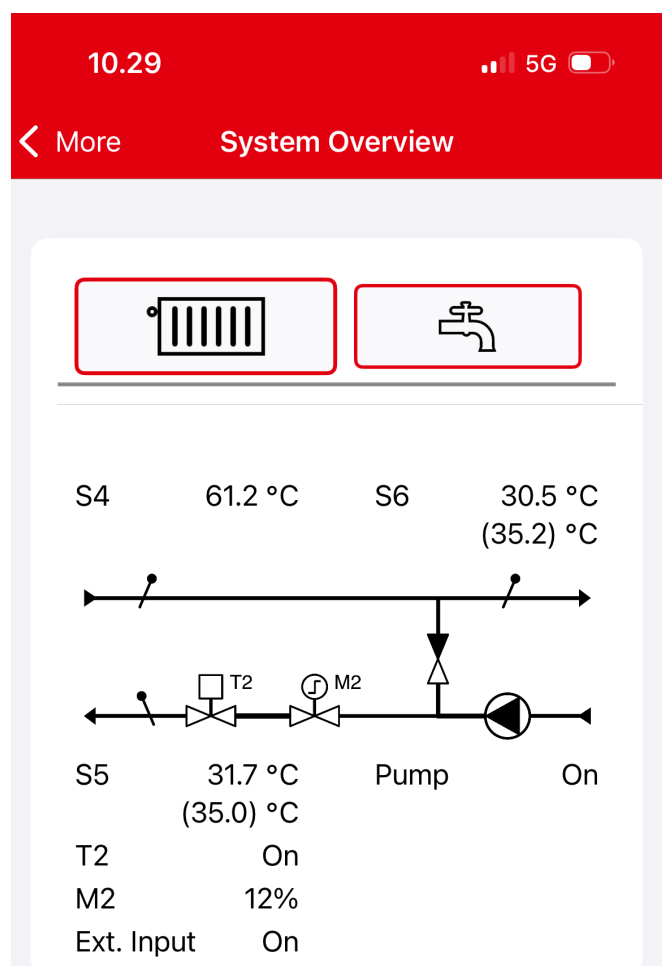
S4: Displays a heat source supply temperature of 61.2 °C

S3: Current hot water temperature is 48.9 °C (desired temperature is 50.0 °C)

M1: Stepper motor with valve indicates that the hot water control valve is 49% open

F1: Shows a draw-off rate of 709 l/h

T1: Bypass valve is closed



7.3 Control the heating function

Verification of the heating function is carried out as follows:

Ensure there is no heating demand (turn down the room thermostats) and check:

1. The pump is not running
2. The M2 valve is closed (0%)
3. External Input is Off
4. The T2 zone valve is On (unless the towel dryer function is activated and the schedule dictates that it should be closed)

Then create a heating demand (turn up the room thermostats) and check:

1. The pump starts
2. The M2 valve opens and regulates if the S6 supply temperature is lower than the desired temperature
3. External Input is On
4. The T2 zone valve is On

If the system does not respond as expected — for example, if the supply temperature is not reached — refer to section 7.5 for instructions on how to check each individual component.

7.4 Control the DHW function

Verification of the DHW function is carried out as follows:

Ensure that no domestic hot water is being tapped. Heating demand may be present so that the station is operating, and check the following:

1. F1 flow sensor reads 0 l/h
2. M1 stepper motor with valve is closed (0%)
3. T1 bypass valve is closed (Off)

Tap domestic hot water from a sink in the dwelling and check the following:

1. F1 flow sensor displays the tap rate in l/h
2. S3 hot water temperature reaches the desired domestic hot water temperature
3. M1 stepper motor with valve regulates

If there is simultaneous heating demand in the dwelling, check the following:

1. The underfloor heating pump is running
2. M2 stepper motor with valve is closed (domestic hot water has priority)

If the system does not respond as expected — for example, if the supply temperature is not reached — refer to section 7.5 for instructions on how to check each individual component.

7.5 Check connected components

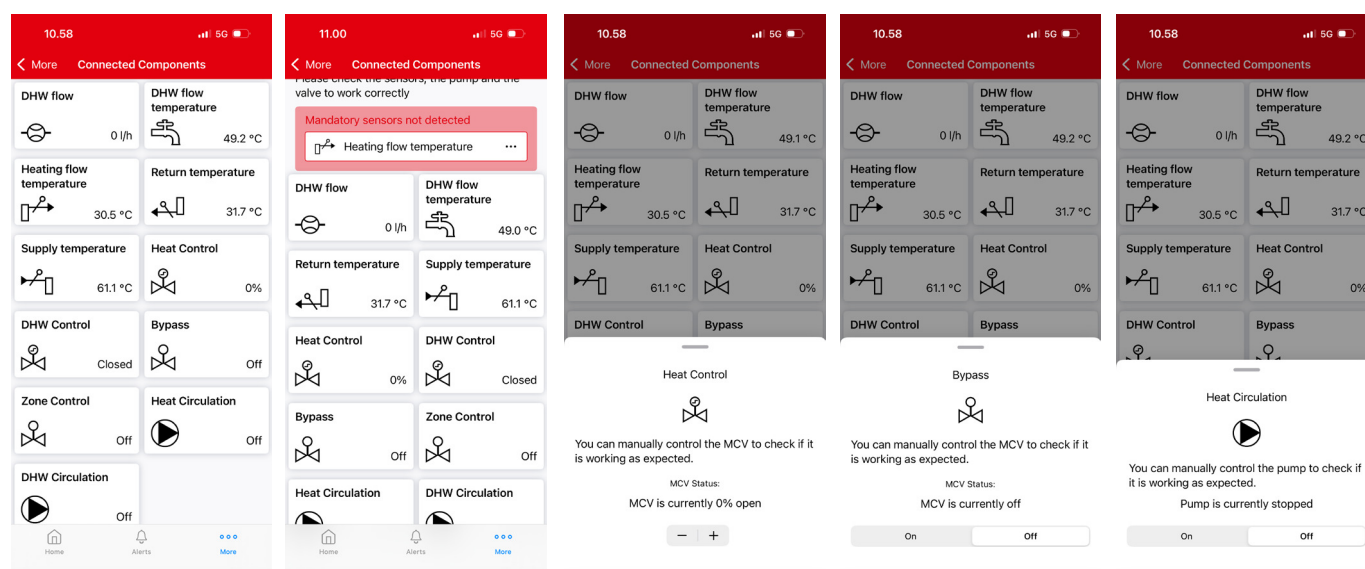
The ECL Go app provides an effective tool for checking the various components of the station in the event of operational issues.

Under the Connected Components menu, an overview of all connected components is displayed. If components are missing or faulty, this is indicated in a red box.

Hot water flow and temperature sensors can be read to verify whether they display the expected values. If, for example, a temperature sensor is incorrectly connected, this can be checked by unplugging the sensor and observing whether the correct sensor reports an error.

Valves can be opened and closed, allowing observation of relevant temperatures to see if they change accordingly. The pump can be started and stopped.

If a walkthrough does not resolve the issue, refer to section 8.0 Troubleshooting.



8. Troubleshooting

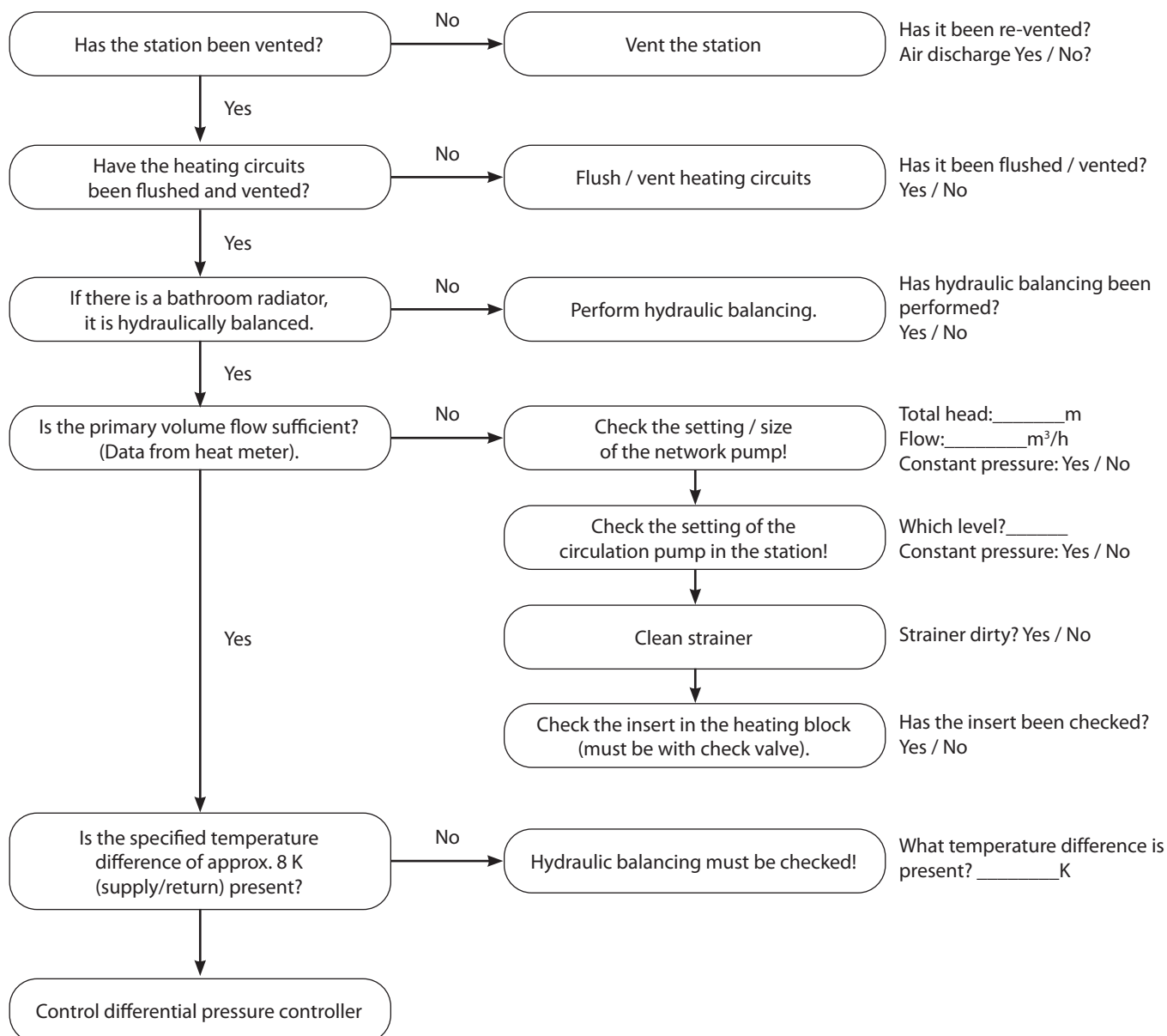


Authorized personel only

Assembly, start-up and maintenance work must be performed by qualified and authorized personel only.

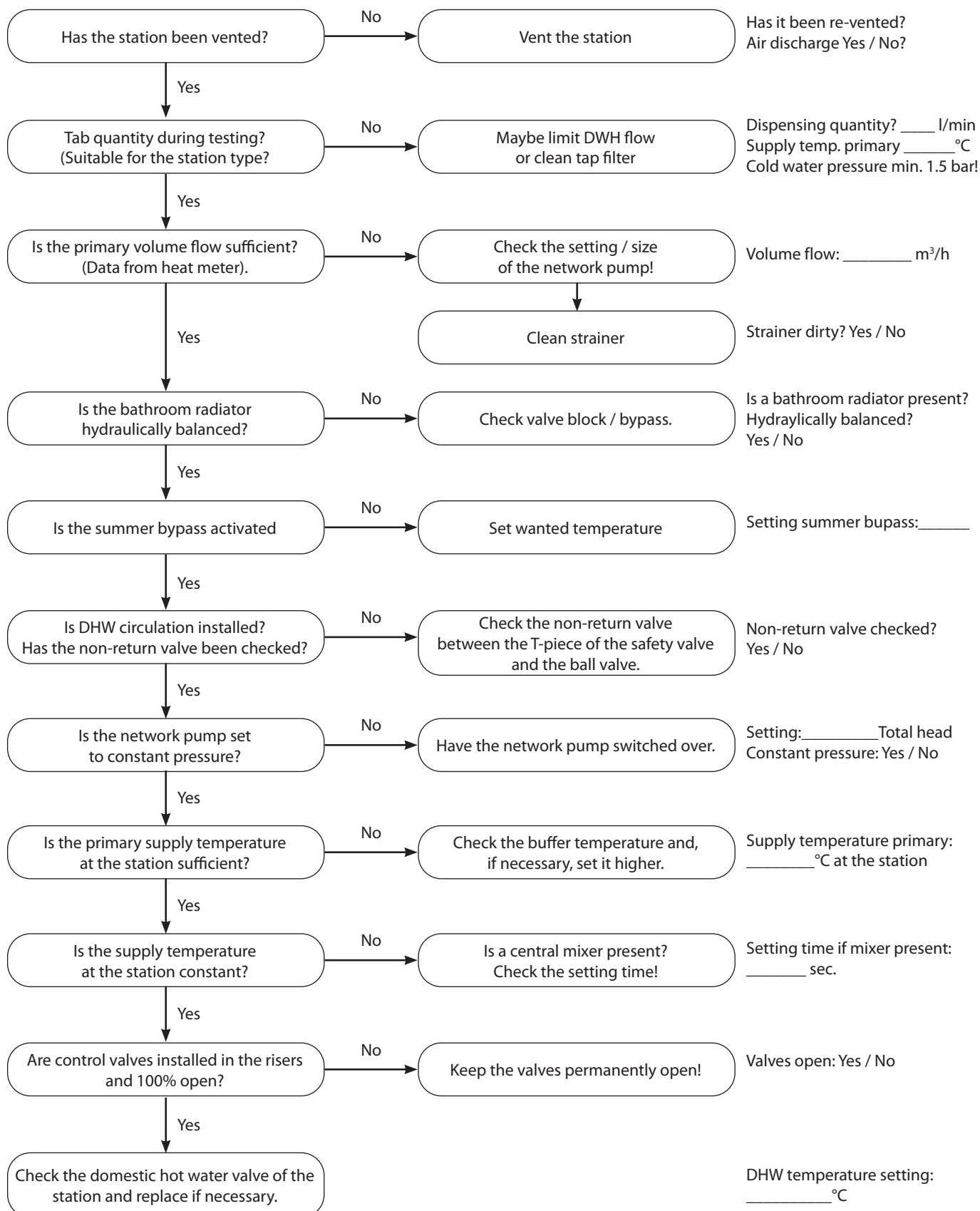
8.1 Troubleshooting heating

If the situation is too little or no heating.



8.2 Troubleshooting domestic hot water

If the situation is too little or no hot water.



9. Maintenance

9.1 Annual Inspection

The EvoFlat 4.0 flat station requires only minimal maintenance. It is recommended to carry out an annual inspection of the station to ensure optimal performance and energy efficiency.

Maintenance and inspection must be carried out in accordance with this manual, in compliance with EN806-5 and should additionally include the following:

The following should be checked:

- Strainer: Inspect and clean the strainer if necessary.
- Air-vent: Check whether air has entered the flat station.
- Visual leak test: Ensure all connections are tight, clips are pulled in and that no water is dripping.
- Water meter: Inspect the water meter in accordance with the supplier's specifications.
- Heat meter: Check all operating parameters – for example, the recorded measurement values, heating source supply flow temperature.
- ECL220 control: Verify that the station regulates underfloor heating when there is a heating demand, and DHW when tapping.

9.2 Inspection for Limescale Deposits in the Heat Exchanger

Limescale deposits in the heat exchanger depend greatly on the exact water quality and the actual operating conditions.

Performance Test of the Heat Exchanger

1. Draw hot water from several outlets simultaneously without adding cold water.
2. Measure the temperature of the hot water at the outlet located furthest from the station.
3. Compare the measured hot water temperature with the hot water temperature set on the actuator.

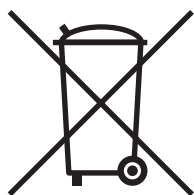
The performance of the heat exchanger is correct if the measured hot water temperature is no more than 5 °C higher or lower than the hot water temperature set on the actuator.

If the difference exceeds 5 °C:

- Check the filter insert.
- Check the flow temperature of the heat source.
- Check the volume flow sensor or the differential pressure.

If the heat exchanger is scaled, it can be descaled in accordance with recognised technical standards. This requires disassembly. Before descaling, please check whether replacing it with a suitable spare part would be more economical than extensive descaling of the heat exchanger.

11. Disposal



This symbol indicates that the station and its accessories must not be disposed of with other household waste when their service life has ended. To prevent potential harm to the environment or human health from uncontrolled waste disposal, the station must be separated from other types of waste and responsibly recycled to promote sustainable reuse of material resources.

11.1 Shutdown and disposal

Shutdown

Disconnect the electrical components of the flat station from the power supply and secure them against reconnection.

- Close both the supply and return water lines.
- Drain both the primary and secondary circuits.

Dismantling

When the flat station reaches the end of its service life, it must be dismantled properly in compliance with the safety instructions contained in this installation guide and disposed of in an environmentally responsible manner.

1. Physically remove the energy supply cable from the station and discharge any stored residual energy.
2. Disconnect other supply lines from the flat station and connected accessories.
3. Collect any water that escapes and dispose it in accordance with local regulations.
4. Remove operating and auxiliary materials as well as any remaining processing materials, and dispose them in an environmentally correct manner.
5. Thoroughly clean components and parts, and dismantle them in compliance with applicable local occupational health and environmental protection regulations.

Disposal

Return worn-out components together with accessories and packaging for recycling or proper disposal. Comply with local regulations in this regard.

The flat station and accessories must not be disposed of with household waste. Proper disposal prevents environmental damage and risks to personal health.

Risk of Environmental Pollution

Incorrect disposal can cause environmental damage.

- Dispose packaging materials in an environmentally friendly manner.
- Recycle components where possible.
- Dispose of non-recyclable components in accordance with local regulations.

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